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College of Veterinary Medicine

Effect of Adding *Plantago lanceolata L.* Seed Powder on Some Productive trait , Physiological Traits and Immune Response of Broiler Chickens .

A Thesis

Submitted to The Council of College of Veterinary Medicine / Karbala University in Partial Fulfillment of The Requirement for The Master Degree in Veterinary Public Health

By

Shaimaa Allawy

Supervised by

Assist prof. Dr .Kadhim Saleh Kadhim

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Supervisors

Assist. Prof. Dr. kadhim saleh kadhim

College of Veterinary Medicine

University of kerbala

22 / 11 / 2022

Assist prof. Dr. Kadhim Saleh Kadhim

Vice Dean for Postgraduate Studies and Scientific Affairs

College of Veterinary Medicine

University of kerbala

22 / 11 / 2022

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This is certify that this thesis **(Effect of adding plantago lanceolata seeds powder on some growth performance , physiological traits , immune response of broiler chickens)** has been prepared by **(shaimaa allawy)** we the members of the examining committee , certify that after reading this thesis and examining the student in its content , it is adequate for the ward of the degree of **Master in the Sciences of Veterinary Medicine/Republic Health** .

Assist prof
Dr.mohanad phelhy hmood
College of Veterinary Medicine /University of Baghdad
(Chairman)

Assist. Prof.
Dr.Ali Mahdi Mahmood Mani
College of Veterinary Medicine /University of Al-Qasim qreen
(Member)

Assist. Prof.
Dr. Ali Redha Abid
College of Veterinary Medicine /University of kerbala
(Member)

Assist. Prof.
Dr.Kadhim Saleh Kadhim
College of Veterinary Medicine /University of kerbala
(Member & Supervisor)

Assist. Prof.
Dr. Ali Redha Abid
Head of the Department of Vet. Public health

Prof.
Dr.Wefak Jbori Al-Bazi
The Dean of the College

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Signature

Dedication

To who gave me love and affection……..My dear Mother.

To the ideal and most expensive heart. From watches to his eyes for us……..My dear Father my God rest his soul .

To my brother Ghassan Allawy ….my God rest his soul .

To My brothers and sisters

To My dear husband---------- Nabeel.

To my supervisor ……..Dr.Kadhim saleh Kadhim

To all who support me honestly in the word ……..

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List of abbreviation

FCR	Feed Conversion Ratio
AST	Aspartate amino transferase
ALT	Alanine amino transferase
ND	Newcastle disease
IBD	Irritable bowel disease
IBS	Irritable bowel syndrome
CHD	Coronary Heart Disease
GSLs	Glucosinolates
HPLC	High Performance Liquid Chromatography
ATB	Adenosine tri phosphate
LDL	Low Density Lipoprotein
HDL	High Density Lipoprotein
VLDL	Very Low Density Lipoprotein
PFA	Phytogenic feed additives
BW	Body Weight
BF	Bursa of Fabrisia
BI	Bursa index
GIT	Gastro intestinal tract

Abstract:

This study was conducted to find out the effect of supplementing broiler diets with *plantago lanceolata* seed powder affected their productivity, biochemistry, immunity, intestine and hepatic

histomorphology. One-day-old Ross 308 broiler chicks were employed in our experiment, totaling two hundred (200). chicks came from an Iraqi commercial hatchery Al-Dewanea. This study lasted for 35 days, from December 24th/ 2021, to January 28th/ 2022, and was carried out at a chicken field in al-mussaib city.

There was a total of 200 chicks used in this study, and they were split evenly between four treatments (50 chicks each treatment) with two replication (of 25 chicks replicat) such as: Chicks in Group 1 (T1) were given a meal devoid of *plantago lanceolata* seed as their only source of plant protein (control group). Chicks in the second group (T2) were given a feed supplemented with *plantago lanceolata* seed (1gm / kilogram diet). Chicks in Group 3 (T3) were given a meal supplemented with *plantago lanceolata* seed (3 gm/kg fed diet). Group 4 (T4): The chicks were given a standard diet included *plantago lanceolata* seed (5 gm/kg) feed diet.

Productive performance (body weight, weekly weight gain, feed intake, and feed conversion ratio (FCR)) are only few of the variables included in the research. Checking kidney function (blood urea, creatinine), liver enzyme (AST,ALT), lipid profile, and protein biochemistry (globulin , albumin and total protein). Reactions of the immune system (antibody titer against Newcastle disease (ND) and Gomboro disease (IBD) and histo change. Some indicators of productivity were assessed every week, while others were evaluated on day 35.

In comparison to the control group, the results showed that the live body weight and weight gain of broiler chicks fed *plantago lanceolata* seed (1gm., 3gm., 5gm. /kg diet) were considerably higher (basal diet). Birds given *plantago lanceolata* seed consumed much less food than control birds. The feed conversion ratio was significantly lower in all addition groups compared to the control group.

Lower levels of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were seen in groups (T2, T3, and T4) as compared to control group. Antibody titers against the (ND) were found to be considerably greater in the T2 group compared to the other study .

There were no statistically significant variations in the relative weights of organs among groups liver, bursa, and Fabricius index

Chapter One: Introduction

Introduction:

Herbs, which are the foundation of traditional Chinese medicine, have long been revered for their therapeutic abilities and have many uses in the prevention and treatment of illness in both humans and animals. Oils, powders, and extract from these plants may be mixed into meals and drinks (Jadhav *et al* ., 2014). The compounds and substances included in these plants affect the immune response and stress (Sujatha *et al*., 2010), thus researchers have tended in recent years to use medicinal herbs and plants in the poultry industry (Hashemi and Davoodi., 2011). According to the World Health Organization, 80% of the global population relies on herbal remedies as their main form of healthcare, this is largely because to the low cost and high efficiency of herbal remedies.

The use of antibiotics, which plays a crucial role in production and for the health of birds by increasing the efficiency of food conversion and growth stimulants, can have a negative effect on human health due to the presence of antibiotic residues in poultry products like eggs and meat (Waters, 2001). One consequence of this is the spread of antibiotic-resistant bacterial species, with obvious consequences for human health (WHO, 1997).

Therefore , scientists have turned to looking for alternatives to antibiotics that might boost chicken development performance without posing the same risks as antibiotics (Langhou , 2000 ; Lee *et al*. , 2004) the use of medicinal herbs and oils as natural and healthy materials and alternatives to many medicines due to their important properties as antibiotics and antioxidants for microorganisms and work to reduce disease - causing bacterial level (Maria Jamil, 2011). In addition to their positive effects as growth enhancers, *plantagolanceolata* seeds also help boost the body's defenses by increasing the production of immune cells and digestive juices.

The seed of the *Plantago lanceolata* is utilized for a variety of things, although nowadays it's mostly in the medicinal field (Roston *et al*. 2015). Presently, roughly 45 patents have been filed based on the potential of plantain leaves, but only a small fraction of them are really being used (Grigore *et al*., 2015).

Aims for study

The present study was designed to evaluation the effect of the properties *plantago lanceolata* seed powder added to chicken diet .

1- Productivity, body weight changes, body gains, feed intake .
2- Biochemical, liver enzymes function, creatinine and urea
3- immunological traits Newcastle vaccine disease titer and Gambaro vaccine disease titer
4- histology from some organ (intestine and liver)

Chapter Two:

Literatures Review

2.1 *Plantago lanceolata* :

The flowering plant species Plantago lanceolata belongs to the plantain family, Plantaginaceae. It is also known as thin leaf plantain (plantago lanceolata, 2017) and ribwort plantain (BSBI , 2007). Plants include English plantain (plants profile for plantago lanceolata), rib leaf lamb, tongue, and buckhorn (Ribwort).

Plantago lanceolata is a herbaceous perennial plant that grows from 5 centimetres up to 50 centimeters with a very fibrous root. The leaves are in basal rosettes and are lanceolate or linear lanceolate, deeply 3 to 5 ribbed, entire-margined or shortdentate. They are sessile, but have a narrow part near the stem and have three or five parallel veins that are branching in the wider part of the leaf (Fosberg et al., 1989).

Plantain (Plantago lanceolata) as known narrow-leaved plantain, ribwort plantain, narrowleaf plantain is a species of plants that are widely distributed in pastures and green areas in the temperate world. It has been used for various medicinal purposes for centuries such as related to the skin, wound healing, inflammation, disorders of respiratory and digestive organs, reproductive system, blood circulation and cancer because of contained a number of exceptional properties. Previous studies have shown that the plantago genus contains five chemicial classes of biologically active compounds, namely flavonoids, monoterpenoids, triterpenoids, iridoid glycosides and phenolic compounds (Stewart 1996; Chiang et al. 2003; Moore et al. 2006).

2.2 A Scientific classification of *Plantago lanceolata*

Kingdom	Plantae - plants
Subkingdom	Tracheabionata – vascular plants
Super division	Spermatophyta
Division	Magnoliaphyta
Class	Magnoliopsida
Sub class	Asteridae
Order	Plantaginales
Family	Plantaginaceae
Genus	plantago
Species	Plantago lanceolata

Figure (2 - 1) *plantago lanceolata* plants . (Morales & Janick,2002)

Figure (2 -2) *plantago lanceolata* seeds(Al-Khazraji, 2009)

2.3 *Plantagolanceolata* Distribution:

The plant forms a rosette and produces flower stalks that are 10–40 cm (3.9–15.7 inch) in height but have no leaves or other foliage. Spreading or upright, the basal leaves are *plantago lanceolate* in shape, with hardly any teeth and three to five strong parallel veins that taper to a short petiole. It has a wrinkled flower stem that culminates in an ovoid inflorescence filled with several tiny blooms, each of which is surrounded by a pointed bract (Blamey ,*et al.*, 2003). Up to 200 seeds may be produced by a single flower. The blooms have a diameter of 4 mm (0.16 in), a green calyx and a brownish corolla with four recurved lobes that have brown midribs and long, white stamens. The natural range of this species extends from temperate Eurasia to the British Isles, where it

is abundant on all except the most acidic soils (pH 4.5). As an introduced species, it has successfully colonized large portions of both the Americas and Australia. Plantain (*plantago lanceolata*) has been studied for its effect on broiler chickens because of its medical uses (as a preventative, therapeutic, and metabolic regulator) because to its bioactive components.

Plantago lanceolata is endemic to Eurasia, but it has been successfully brought to North America and many other regions throughout the globe where it may thrive in its new environment (Anderberg, Arne,2010).

Used as a proxy for agricultural activity in pollen diagrams, the presence of *Plantago lanceolata* in western Norway from the early Neolithic period forward is seen as evidence of grazing in that region at the time (Hjelle,*et al*.,2006). *Plantago lanceolata* prefers wide fields where the soil is constantly trampled by cattle, thus this makes perfect sense. In Iraq, the plant is wildly cultivated in moderately fertile soil in a sunny position and near riversides (Al-Rawi, 1988).

2.4 Medical Applications :

In antiquity, ribwort plantain leaf medicinal items were widely used as a treatment for a variety of conditions due to their peculiar qualities (Kolodziej . 2006). They have a bactericidal and anti-diarrheal action and are used mostly now to treat inflammation of the upper respiratory tract and to speed up skin regeneration. Recent studies have revealed that extracts of P. lanceolata, or some isolated constituents are effective materials that have several medical applications.

Herbalists often include Plantago lanceolata into their blends for use in medicinal teas and other preparations (Val ,2009). The leaves may be soking into a soothing tea that can help alleviate a cough. Leaves of the Plantago lanceolata shrub have been employed in traditional Austrian medicine for the treatment of respiratory tract, skin, insect bites, and infections, both orally (as syrup or tea) and topically (Freshleaves) (Vogl , *et al*., 2013). When the leaves are extremely young, they are edible (Benoliel, .2011).

Plantain (Plantago lanceolata) has been used for millennia for a wide range of medical reasons, including those involving the skin, wound healing, inflammation, problems of the respiratory and digestive systems, the reproductive system, the blood circulation, and even cancer.

World Health Organization clinical data recommended the plantago lanceolata seed genus for use in reducing elevated blood sugar after a meal (Kolodziej. 2006; De Natale. & Pollio 2007; Haddadi *et al.* 2014; Grigore *et al*. 2015; Bahadori *et al*. 2020; Elbesthi *et al.* 2020). Irritable bowel syndrome (IBS), diverticulitis, duodenal ulcer-induced constipation, hemorrhoids, and lowering CHD risk alongside dietary changes.

The Ethanolic extract of P. lanceolata prevented elevation of plasma and hepatic malondialdehyde formation (evidence of lipid peroxidation), as well as, liver function enzyme levels of aspartate transaminase (AST) and alamine transaminase (ALT) (Aktay *et al.,* 2000). The crude polysaccharides From the leaves of P. lanceolata have exhibited significant immunomodulatory properties with a particularly high adjuvant activity (Ebringerová *et al.,* 2003). The alcoholic extract of P. lanceolata was potentials effect as antioxidant. Gálvez *et al.* (2005). They characterized the antioxidative activities of methanol Leaf extracts and certain pure compounds from the leaf extracts of P. major possess antiviral activities. Phenolic compounds are the major bioactive compounds found in extracts of P. major that exhibit potent anti-herpes and anti-adenoviral activities (Chiang *et al.,* 2002).Leaf extracts of P.lanceolata have been utilized for treatment of skin cancer (Samuelsen, 2000).

2-5 Active Compounds of *Plantagolanceolata* :

Plantagolanceolata, containe a variety of sugar and polysaccharide components of the seed mucilage(Ahmed *et al.,* 1965). The seeds also contain fixed oil, protein, iridoids and tannins. Further different active compounds have been detected as constituents of P. lanceolata including acids (benzoic, caffeic, chlorogenic, cinnamic, p-coumaric, fumaric, salicylic, ursolic, vanillic and ascorbic acids), alkaloids (boschniakine) and amino acids (alanine, asparagine, histidine and lysine) (Bisset, 1994; Newall *et al.,* 1996). Previous studies have shown that the plantago genus contains five chemicial classes of biologically active compounds, namely flavonoids, monoterpenoids, triterpenoids, iridoid glycosides and phenolic compounds (Stewart 1996; Chiang *et al*. 2003; Moore *et al.* 2006).

Phytochemical inquiry has indicated the existence of non- nutritive components are secondary metabolites , such as Glucosinolatea (GS) occurs in high quantities connected with the Plantaginaceae family plants (Talalay and Fahey , 2001 ; D,Antuono *et al.,* 2008). Anticarcinogenic and antioxidant properties of these chemicals are of major relevance to human and animal health (Kim *et al.,* 2004). According to research

(Yehuda *et al.,* 2009), the primary isothiocyanate in plantago lanceolata seeds is MTBI (4methylthiobutylisothiocyanate), which may represent a novel class of natural chemicals with potent skin inflammation-preventive properties (Avila, 2014).

Al-khazraji (2009) found flavonoids and phenolic substances in the seeds of plantago lanceolata. have an excellent antioxidant capabilities both in vitro on in vivo by inhibiting the free radical to becoming a mineral – attracting substance called the chelating agent (Barillari *et al* ., 2005: Alam *et al.,* 2007) . Carotene and vitamins K, C, E, and most forms of vitamin B groups including Biotin (B6), Riboflavin (B2), and thiamine (B1) are only some of the vitamins and minerals found in abundance in Plantago lanceolata seeds. (Barillari *et al.* 2005; Cartea *et al.* 2011).

Due to its high concentration of antioxidants, this plant has been shown to have positive effects on the health of humans and animals by preventing the slow but steady destruction of cellular and tissue structures inside the body (Fratianni *et al.,* 2014)

2.5 .1 Glucosinolates (GSLs)

Glucosinolates (GSLs) are a substance that is a precursor to isothiocyanates (ITcs) (Fahey *et al*., 2001). Their full chemical name is Beta - thioglucoside-N-hydroxyl sulfates. Plants of the Plantaginaceae family produce glucosinolates (GSLs) as a byproduct of their primary metabolism of amino acids, either aliphatic ones like methionine, alanine, valine, leucine, and isolucin or aromatic ones like tyrosine, phenylalanine, and tryptophan (Wittstock and Halkier, 2002). Additionally, the existence of the Plantaginaceae family means that *Plantago lanceolata* seeds include various non-nutritive substances that are the products of the plant's secondary metabolites, such as Glucosinolates GLS compounds, which are present in a high quantity (Cavaiuoloand Ferrante, 2014). Data from high-performance liquid chromatography (HPLC) of phenols and flavonoids components in *Plantago lanceolata* seeds reveals that rutin concentration is highest, followed by kaempperol, resorcinol, ellagic acid, quercetin, salicylic acid, vanillin, and finally tannic acid.

Glucosinolates have the same anti-cancer, anti-fungal, antibacterial, and antioxidant properties as flavonoids (Jin *et al*.,2009). Plantain is the primary glucosinolate in the seeds of this plant, and it has the potential to protect cells against oxidative stress in three ways: by inducing phase II enzymes, by scavenging hydrogen peroxide and alkyl hydroproxides accumulated in cells and peripheral blood, and by acting as a precursor of sulforaphene, a potent inducer of detoxifying electrophiles and

an increase in cellular antioxidant defenses (Barillari *et al*.,2005). According to the results of a high-performance liquid chromatography (HPLC) analysis of the glycosides compounds in the seeds of *Plantago lanceolata*, the 6-methylthiobutyl-3-oxo-hexyl glucosinolate has the greatest quantities, followed by the 4-methyl thiobutylglucosinolate and the nerucic acid.

It loses its structure and decomposes into a variety of sulfur and other products, including isothiocyanate, thiocyanate, and nitrile compounds; these properties classify it as a thiogluside (Keck and Finley, 2004). It has been estimated that there are between 80 and 129 different glucosinolates, as reported by different researchers (Dey and Harborn, 1997; Fahey *et al*., 2001; Keck and Finley, 2004).

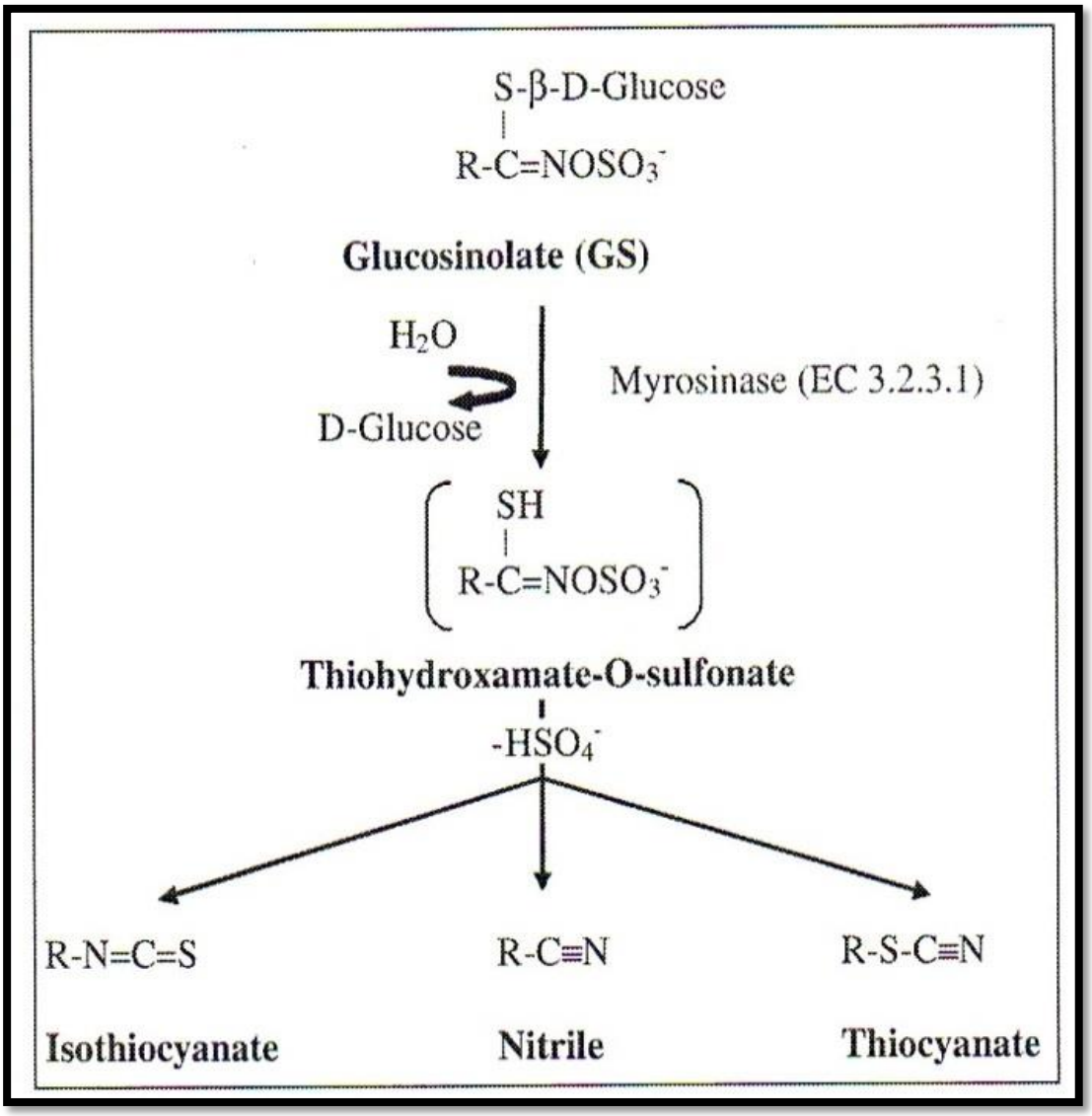


Figure (2-3) : Decomposition of Glucosinolates compounds (Keck and Finley, 2004)

2.5.2 Flavonoids

Flavonoids are powerful antibacterial, antiviral, and anticarcinogenic compounds, and they are efficient antioxidants both in vivo and in vitro by scavenging free radicals. They are also a material removed the metals, termed a chelating agent (Alam *et al*.,2007).

Flavonoids, which are a kind of polyphenol, are 15-carbon molecules with the formula C6-C3-C6. Vegetables, cereals, tree bark, roots, and flowers all contain it, making it an essential element of the diet (Cartea *et al*., 2011).

There are around 5,000 unique derivative flavonoids, distinguished by subtle differences including the quantity and location of hydroxyl groups, methoxyl group synthesis at certain locations, binding to monosaccharides, and the subsequent occurrence of an acylation process and rearrangement (Merken and Beecher , 2000) examining the phenolic and flavonoid content of *plantago lanceolata* seeds . Flavones are the main flavonoids in P. major (Kawashty *et al.*, 1994; Nishibe *et al.*, 1995). Flavones tend to replace flavonols in Plantago (Harborne & Williams, 1971). Subgenera Plantago have a tendency to produce flavones, luteolin and 6-hydroxy luteolin. Attempts have been made to use flavonoids as taxonomic markers in Plantago (Kawashty et al., 1994).

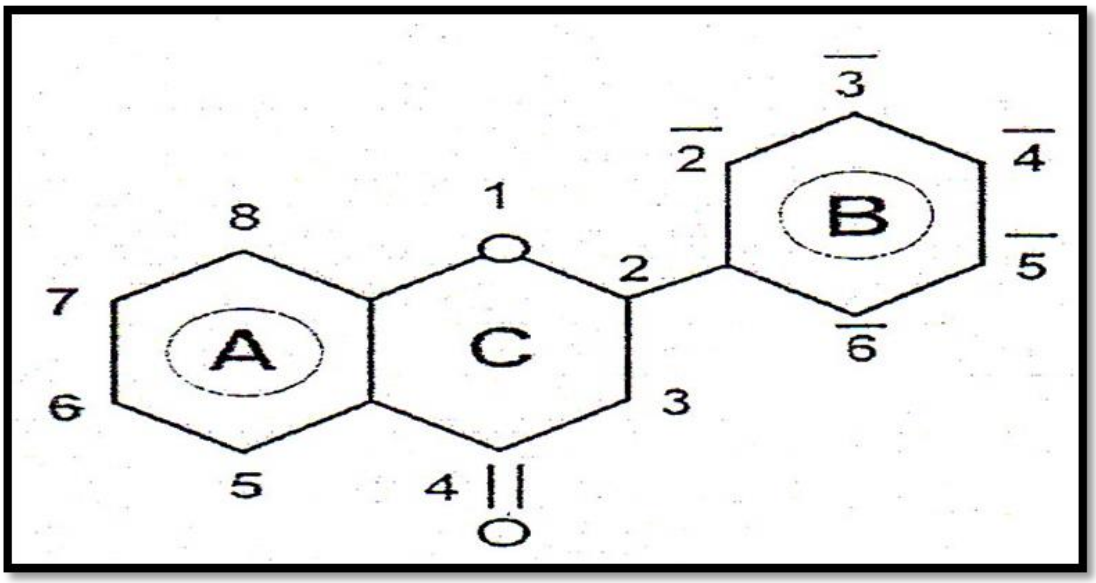


Figure (2-4):General chemical composition of flavonoid (Cartea *et al*.,2011)

The flavonoids and phenols in *plantagolanceolata* seeds were isolated using high performance liquid chromatography.

When medicinal herbs were included in the diets of broiler chickens, Al-Nasrawi,(2013) found that the birds gained weight more quickly, had a higher feed conversion ratio, and weighed more overall. This enhancement may be understood because it contains some of the active components that aid in the production of the growth hormone and subsequent rise in body weight.

The addition of the powdered extract of the *plantago lanceolata* plant to the feeds of broiler chickens has been shown to significantly increase their productive qualities. Flavonoid components are among the active chemicals that play a critical role in maintaining good health and preventing sickness.

Table(2-1) shows the Flavonoids and phenols compounds of retention time , area and concentration.

Seq.	Subject	Retention time \minute	Area µ volt	Concentration 25 µg\ml
1	Vanillin	1.59	159126	56.32
2	Ellagic acid	2.76	149636	110.41
3	Salicylic acid	3.69	148978	58.53
4	Resorcinol	4.44	142905	128.22
5	Quercetin	5.29	177465	99.72
6	Tannic acid	6.22	133610	47.12
7	Kaempferol	7.37	137571	217.36
8	Rutin	8.59	149268	269.57

2.6 Plantago lanceolata seeds effect on Physiological trails

alanine aminotransferase (ALT) or gamma- glutamyltranspeptidase (ALT) was found high concentrations in the liver and kidney and at lower levels in skeletal muscle and the heart. Despite the fact that both AST and ALT blood levels rise in response to illness processes that compromise liver cells.

The body naturally produces both creatine and protein. Both are utilized as weight gain supplements because of their roles in promoting muscular function and increasing strength in existing muscle tissue.

The liver is responsible for creatine production, and the amino acid is then carried to the muscles through the bloodstream.

Creatine is a byproduct of protein metabolism that plays a role in the production of ATP, the primary fuel source for skeletal muscle contractions.

Muscle cells store creatine by transforming it into phosphocreatine, a molecule containing a high-energy phosphate group.

During very strong muscular activities, phosphocreatine is required to generate adenosine triphosphate (ATP).

The herbs plants with antioxidant properties showed hepatoprotective activity against APAP toxicity (Lee etal.,2012 and Sabri etal.,2012).Plantago major (P. major), also known as greater plantain or broadleaf plantain, is a medicinal herb with potent antioxidant effect (Beara etal., 2009).

Ethanolic extract of P. lanceolata was studied for possible hepatoprotective effects using the carbon tetrachloride-induced hepatotoxicity model in rats. The extract significantly prevented the elevation of plasma and hepatic malondialdehyde formation (evidence of lipid peroxidation), as well as, liver function enzyme levels of aspartate transaminase (AST) and alamine transaminase (ALT). Such findings were ascribed to the plant extract constituents that may have a potent hepatoprotective activity (Aktay *et al.*, 2000).

The herbs extract prevented the increasing of plasma and evidence of lipid peroxidation, in addition to the levels of liver enzyme function of aspartate transaminase (AST) and alamine transaminase (ALT) (Fons *et al.*,1998).

Eldosaky *et al* (2018)found The defatted aqueous methanolic extract of the air-dried aerial parts of Plantago major, antioxidant and hepatoprotective effects. it inhibited the serum activity elevation of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and gamma-glutamyl transferase (GGT) enzymes and total and direct bilirubin. It increased the serum total protein and albumin and attenuated CCl4-induced lipid peroxidation (LPO) and increased GSH in the liver homogenates. P. major has potent antioxidant, anti-inflammatory, and hepatoprotective activities. Alanine aminotransferase (ALT) or gamma-glutamyltranspeptidase (ALT) is found in relatively high concentrations in the liver and kidney and at lower levels in skeletal muscle and the heart.

The body naturally produces both creatine and protein. Both are utilized as weight gain supplements because of their roles in promoting muscular function and increasing strength in existing muscle tissue.

The liver is responsible for creatine production, and the amino acid is then carried to the muscles through the bloodstream.

Creatine is a byproduct of protein metabolism that plays a role in the production of ATP, the primary fuel source for skeletal muscle contractions. Muscle cells store creatine by transforming it into phosphocreatine, a molecule containing a high-energy phosphate group. During very strong muscular activities, phosphocreatine is required to generate adenosine triphosphate (ATP).

Proteins are essential building blocks for skeletal and muscular systems. Enzymes, antibodies, and hormones are only a few examples of the crucial roles played by proteins in maintaining health. Creatine's function in skeletal muscle contractions sets it apart from protein.

Chapter Three: Methodology

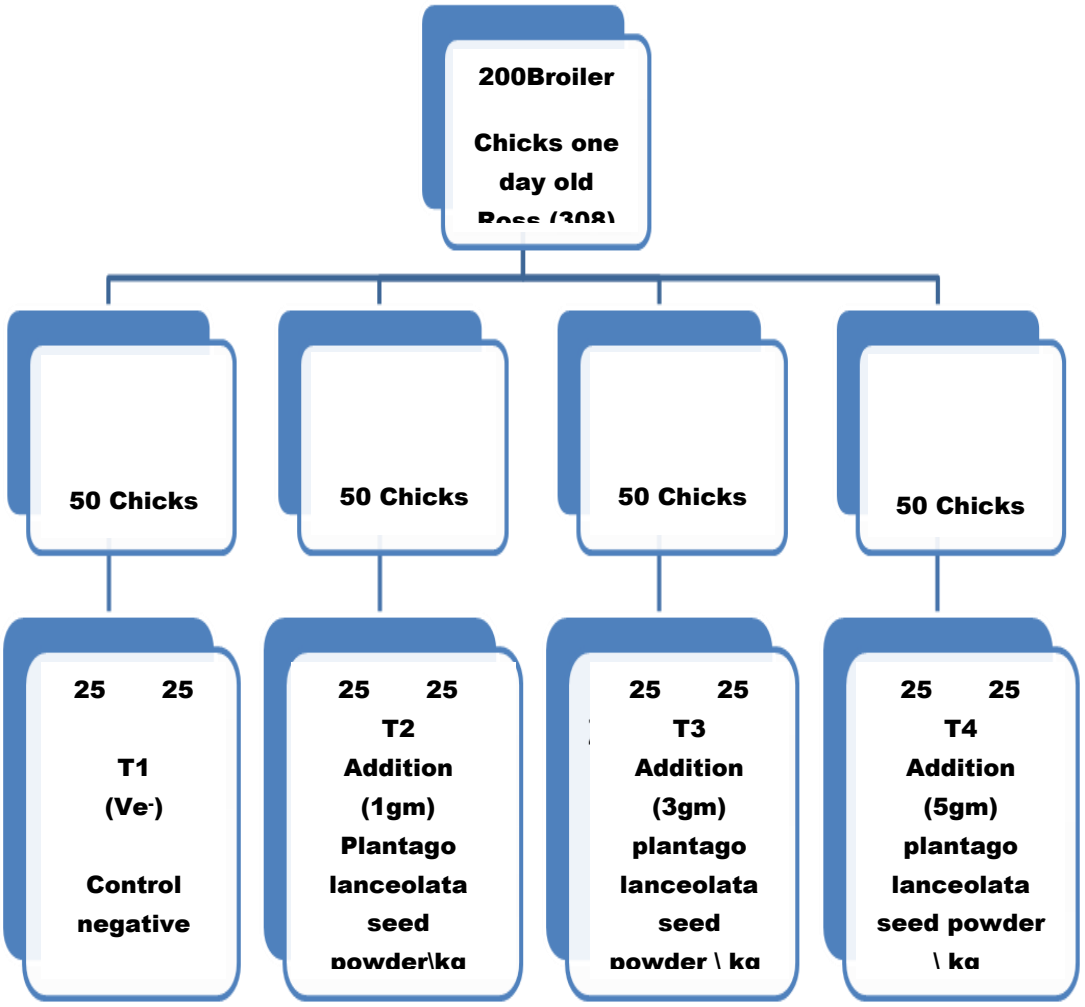
3 - Methodology

3-1 Experiment Place and Time

This study was carried out at poultry farms of Al-Musaib / Babylon city from December 24 December up to 28 of January 2022.

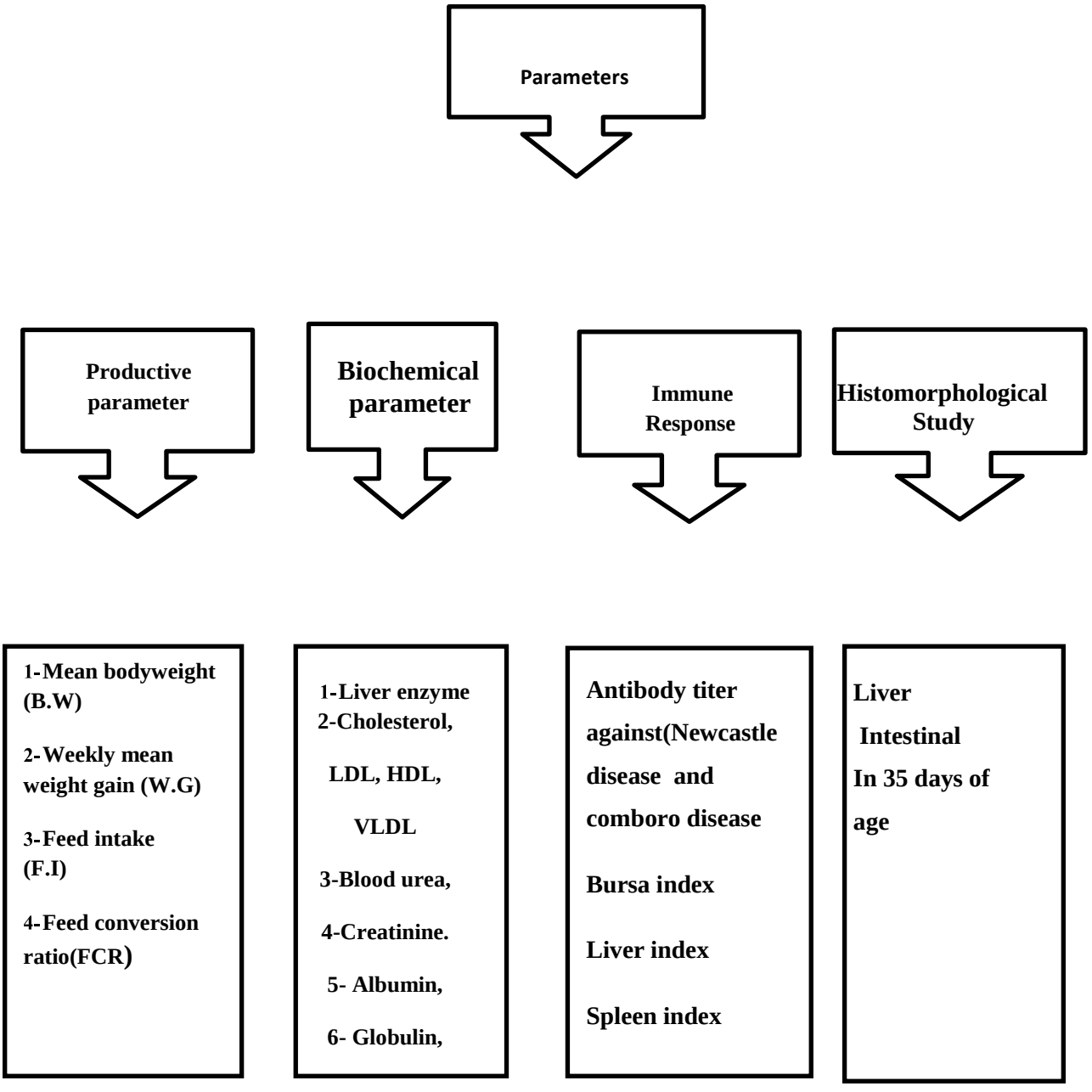
3- 2 Experimental Design :

A total of two hundred (200) chicks rose 308 were obtain at one day from Al-debla hatchery un-sexed broilers for use. Chicks were kept in farm poultry and divided (4 groups) randomly (50 chicks) in separated (control T1 was fed on control diet (without any addition and kept as a control, T2, T3, and T4). From a high of 32c^{o} in the first week of life, the temperature was gradually reduced by 2 c^{o} every week until it reached a low of 25 c^{o} at the end conclusion of the experiment. There was 23 hours of lightness and just one hour of darkness.



Scheme(3.1)experimental design

3-3 parameterts



Scheme3.2parameters

3-4 Preparation of diet

The *plantago lancelota* seeds used in the broiler diet were purchased from a nearby store and ground into a powder using a standard home miller. They were reduced to a powder and put to the ross 308 broiler diet at the specified levels for the experiment.

The following are the ingredients that went into the chicken's diet during all four deals:

In the first (T1) group, they were provided a control meal with no extra ingredients.

The second (T2) group had their regular food supplemented with 1 gm of *plantago lanceolata* seeds powder per kilogram of diet.

The third (T3) group had their regular food supplemented with 3 gm of *plantago lanceolata* seeds powder per kilogram of diet.

In the fourth group (T4), the animals were given their regular food in addition to 5 gm of *plantago lanceolata* seeds powder per kilogram of diet.

3-5 Chicks management:

In the poultry farm of Al-Musaib city, chicks were raised using a 4-treatment, 8-replicate system in a semi-hall closed space of 150 square meters split into wire mesh barriers to 8 replicate, each of which had its own door. Each wall was 2 meters in height and 2.5 meters in width. Throughout the duration of the trial, the floor was covered with sawdust (with a thickness of 5 cm), and the constant 23 lighting system was maintained. Both the gas incubator and the apparatus were put to work. Plastic feed trays were used in the first week of the bird's age, with one dish for each barrier; after two weeks, the trays were replaced with cylindrical hanging feeders with a diameter of 40cm, at a rate of one feeder for each barrier. This was done to ensure adequate ventilation and temperature throughout the different stages of the bird's growth. If the chicks' chests are at the same level as the parent bird's, then they are at least one day older. Feed and water were supplied ad libitum; all birds were fed the starter ration and the finished ration.

3 -6 vaccination Program:

Vaccination distribution via the drinking water supply is a widespread and helpful practice in industrial poultry. The whole immunization effort is relied on Volvac® vaccinations (Boehringer Ingelheim-HQ Germany). All of the baby chickens were immunized (Table3-1)

Table (3-1) shown the vaccination program.

Age of chicks/days	Disease	Administration route
1	ND(Oily)	Injection into the neck under the skin
1	IB	Eye drops
10	ND	Drinking water
21	ND	Eye spray

Two days before immunization, the irrigation system was properly prepared by flushing it clean of any disinfectants, such as chlorine. As part of the immunization process, chicks had their access to water cut off for around two hours.

3.7-Materials:-

3.7.1-Chemicals:-

Table (3-2)chemical materials

No. of item	Materials	Origin
1	Buffered formalin 10%	BDH-England
2	*Plantago lanceolata* seed	Local market - Iraq
3	Histological microtome	Germany
4	IBD strain	Hungary
5	Kit for AST & ALT	Egypt
6	Kit for TC ,TAG,LDL,VLD&HDLD	Spain
7	Kit for total protein and albumin	Spain
8	Kit for blood urea and creatinine	Egypt
9	ND and IBD kit	USA
10	ND Lasota strain	Germany

3.8 Equipments and instruments:-

Table (3-3) Equipments and instruments

No. of item	Equipment's	Origin
1	Centrifuge	England
2	Deep freezer	Germany
3	Electric sensitive balance	Switzerland
4	Elisa reader	USA
5	Elisa washer	USA
6	Gas for incubator	Local market – Iraq
7	Eppendrof tubes	China
8	Manual plastic drinkers (5L)	Local market – Iraq
9	Manual plastic feeder	Local market – Iraq
10	Mechanical balace	Germany
11	Thermometer	Local market – Iraq
12	Syrange (5cc)	China
13	Millor	Local market – Iraq
14	Cohol	Germany
15	Test tube	China
16	Coton	China
17	Scalpel	China
18	Scissors	China

3-9 Productive Traits

3-9-1Weekly live body weight (gm)

On days 1, 7, 14, 21, 28, and 35, the birds were individually weighed using a precise electronic balance. All of the birds' actual live body weights were recorded (Al-Fayadh and Naji,1989). Using a scale with a single pan, we determined the average weight of the birds in each replication and then extracted the average weight of a single bird by weighing the birds at the end of each week after increasing the meal for three hours prior to the weighting date (Al-Zubaidi , 1986).

3-9-2 Weekly weight gain (g):

Each week, participants in each group recorded their starting and ending body weights and used the following formula to determine their mean weekly weight gain:

Average weekly weight gain formula= weekly ending weight - weekly starting weight.

According to (Al-Fayadh and Naji,1989).

3-9-3 Weekly feed consumption :

Weekly feed intake was determined by weighing the leftover feed at the conclusion of each week and subtracting that amount from the feed quantity supplied at the start of the same week, with the number of dead chicks and feeding days taken into account.

The chicks' food consumption was determined using the formula given by (Al-Fayadh and Naji, 1989):

Calculating Weekly Feed Intake (gm/chick) = W/L + D

W = weekly feed consumption (gm).

D = (days of feeding x)/(number of dead chicks).

Every week, the FCR should be 3, 7, 4, etc.

Each experimental group's weekly feed conversion ratio was calculated using the formula given by (Al-Zubaidie,1986). standard weekly rations (gm) . Average weekly weight increase equals weekly feed conversion ratio (gm) .

3-9-4 weekly feed conversion ratio (FCR) .

The weekly feed conversion ratio was measured for each group in the experiment as the equation mentioned by (Al-Zubaidie,1986).

$$\text{Weekly feed conversion ratio} = \frac{\text{Average weekly feed intake (gm)}}{\text{Average weekly body weight gain (gm)}}$$

3-10 physiological Traits

3-10-1 Biochemical parameters

On day 35, a blood sample is taken from the wing vein into a test tube without any anticoagulant. Following centrifugation at 3000 rpm for 5 minutes, the serum was collected and placed in a freezer at -20 degrees for future analysis. Newcastle disease and Gomboro disease may be diagnosed by testing the blood for globulin, albumin, total protein, liver enzyme, and antibody titer.

3-11 Measurement of liver enzyme concentration

3-11-1 ALT Concentration Measuring

In order to determine alanine aminotransferase activity, we used a specialized kit in accordance with the (Young, 1990) protocol. Appendix (2)

3-11-2 AST Concentration Method

Using a specialized kit and the (Young, 1990) protocol, we determined the aspartate aminotransferase activity. Appendix (2)

3-11-3 Total protein concentration measurement

Using a specialized kit calibrated to the (Young, 1990) technique, we determined the levels of total protein and cholesterol, LDL, HDL, and VLDL in the sample. Appendix (1)

3-12 Estimation of serum Albumin concentration:-

The serum albumin concentration was calculated using a colorimetric kit calibrated to the (Young, 1990) standard. Appendix (3)

3-13 Estimation of serum Globulin concentration:-

Total glubuline concentration was calculated using an indirect method based on the (Young. 1990) equation.

Total serum protein minus albumin yields globulin concentration in grams per deciliter.

3-14 Blood Cholesterol Levels .

Used a specialized kit and the procedure outlined in (Young, 1995) are to get a reading. Appendix (4).

3-15 Blood Triglycerides levels

Triglyceride concentrations were determined using a commercially available enzymatic kit (Fossati & prencipe, 1982). Appendix (5).

3-16 Blood HDL level:

Very low density lipoprotein (VLDL) and low density lipoprotein (LDL) chylomicrons were precipitated upon addition of phosphotungstate and magnesium ions. HDL levels were determined using a commercially available kit according to the protocol described in (Grove, 1979). Appendix (6).

3-17 Blood Very low density lipoprotein (VLDL) level:

The standard equation for estimating VLDL was used (Friedewald *et al* ., 1972)
Calculating VLDL (mg/dl) from TAG (mg/dl) yields a result of 5.

3-18 Blood low-density lipoprotein (LDL) level:

Used the Friedewald *et al.* 1972 technique is to determine. Appendix (7)

3-19 Analysis of renal function estimation

3-19-1 Creatinine concentration :

Tietz (1986) describes a procedure whereby creatinine is converted into a colorful complex through reaction with alkaline solution and picric acid. Appendix (8).

3-19-2 Blood urea concentration:

The urea concentration was calculated using a predetermined kit and a predetermined procedure (Tietz, 1990). Appendix (9)

3-20 Vaccine Antibody titer for Newcastle disease and Gomboro disease

A specific kit was used to estimate Newcastle and Gomboro disease using the approach described in (Tietz, 1990). Appendix (10).

3-21 bursa index

The body weight (gm) and bursa weight (gm) were recorded for each individual bird, and bursal index (bursa weight/ body weight × 100) was calculated.

3-22 spleen and liver index

The body weight (gm) and spleen and liver weight (gm) were recorded for each individual bird, and spleen index (spleen or(and) liver weight / body weight × 100) was calculated.

3-23 Tissue samples and Histology.

As of day 35, five birds were chosen from each treatment and weighed. After being killed via cervical dislocation, the birds' digestive systems were systematically removed. The liver and the middle portion of the jejunum were taken for histological measures after the intestines were emptied. Each section's samples were submerged in a formalin solution containing 10%.

The Histological technique developed by Lona *et al.* (2001). for histological analysis was used Light microscopy was used to look at samples that had been preserved in formaldehyde solution from each slice.

3-24 Statistical Analysis

The Statistical Analysis System- SAS (2012) program was used to effect the production and physiological parameters of Locale chickens. Least square means (General Linear Model procedure) and Duncan's (1955) .

Chapter Four: Results

4- Results

4-1 Effect of *plantago lanceolata* seed on weekly live body weight (g) .

Table (4-1) show no differences in the W1& W2 live body weight at the experiment for all treated groups , in contrast live BW increases in all groups often W3,W4 andW4 , the T3 revealed showed a statistically significant (P≤0.05) higher value than treatment .

Table 4. 1 Effect of different concentrations of *plantago lanceolata* seed power on weekly live body weight (g) at 35 days (Mean ±SE)

Age / Groups	W1 (Mean ±SE)	W2 (Mean ±SE)	W3 (Mean ±SE)	W4 (Mean ±SE)	W5 (Mean ±SE)
T1 (control)	144.92 ±1.77 A	433.62±5.18 A	914.85 ±11.73 C	1500.75±23.67 B	2194.51±41.71 B
T2 (1g/kg)	150.31±1.85 A	445.33±7.26 A	948.45 ±12.69 B	1538.73±14.68 B	2157.15±47.86 B
T3 (3g/kg)	140.50±1.35 A	450.35±3.33 A	993.17±12.37 A	1699.90±28.74 A	2398.97±28.14 A
T4 (5g/kg)	150.55±1.35 A	433.45±3.55 A	963.12±12.13 B	1539.23±31.21 B	2200.38±33.73 B

The different letters in the same column refer to significant differences between different treated groups at (P<0.05)

4-2 Effect of *plantago lanceolata* seed on weekly weight gain (g) (Mean ± SE)

Broiler weight gain on a basic diet, with and without *plantago lanceolata*, over all experimental periods is shown in table (4-2). That the first and second week's weight gain showed no statistically significant differences between the treatment groups.

Further, in the third, fourth, and fifth weeks, group T3 recorded significant (P≤0.05) greater weekly body weight growth compared to the other groups, whereas group T4 reported considerably (P≤0.05) reductions in the weekly body weight gain in the fifth week.

Table 4. 2 Effect of different concentrations of *plantago lanceolata* seed powder on weight gain (g) (Mean ±SE)

Age / Groups	W1 (Mean ±SE)	W2 (Mean ±SE)	W3 (Mean ±SE)	W4 (Mean ±SE)	W5 (Mean ±SE)
T1 (control)	109.92 ±2.99 A	291.73±5.77 A	465.31±65.70 B	633.20±143.66 B	690.22±51.11 B
T2 (1g/kg)	109.67±2.89 A	322.79±15.70 A	459.24±45.17 B	640.55±135.44 B	700.47±135.33 B
T3 (3g/kg)	113.15±1.77 A	311.82±8.39A	490.35±63.09 A	749.76±148.69 A	750.00±67.37 A
T4 (5g/kg)	111.77±2.24 A	323.14±15.72 A	467.76±76.16 B	679.70±159.28 B	689.19±69.59 C

The different letters in the same column refer to significant differences between different treated groups at ($P<0.05$)

4- 3 Effect of *plantago lanceolata* seed on Weekly feed consumption (Mean ±S.E)

Feed intake throughout the study periods (3-5 weeks) was significantly different ($p< 0.05$) between the 1%, 3%, and 5% *plantago lanceolata* seed powder treated groups and the control groups (Table 4-3). Among the treatment groups, T2 had the highest feed intake in the second week, whereas T1 had the highest feed consumption in the fourth, and fifth weeks of the trial. While the T3 and T4 group's feed intake decreased significantly ($P< 0.05$) over weeks 3 and 5, the T3 group's decrease was not as dramatic.

Table 4- 3 The effect of *plantago lanceolata* seed on Weekly feed consumption (Mean ±S.E).

Age / Groups	W1 (Mean ±SE)	W2 (Mean ±SE)	W3 (Mean ±SE)	W4 (Mean ±SE)	W5 (Mean ±SE)
T1 (control)	132.55±2.33 A	444.06±27.33 A	566.49±23.33 A	977.50 ±95.29 A	1000.0±52.33 A
T2 (1g/kg)	134.44±4.55 A	457.11±37.55 A	559.85±15.55 A	911.66 ±79.66 B	995.60±57.05 A
T3 (3g/kg)	129.11 ±1.33 A	433.29±30.55 A	532.00±15.55 B	912.88±133.22 B	895.10±58.53 C
T4 (5g/kg)	130.44 ±4.43 A	439.57±26.59 A	520.55±35.09 B	932.68±77.07 A	965.22±35.33 B

The different letters in the same column refer to significant differences between different treated groups at ($P<0.05$)

4- 4 Effect of *plantago lanceolata* seed on Feed conversion ratio :

There was no statistically significant difference ($p < 0.05$) between the control and treatment groups in terms of feed conversion ratio over any time period studied (1-5 weeks), with the exception of the T3 group, which showed a statistically significant increase ($P<0.05$) in feed conversion ratio compared to the other groups during W4and W5 (Table 4-4).

Table 4. 4 Effect of different concentrations of *plantago lanceolata* seed powder on feed conversion ratio (Mean ±SE)

Age / Groups	W1 (Mean ±SE)	W2 (Mean ±SE)	W3 (Mean ±SE)	W4 (Mean ±SE)	W5 (Mean ±SE)
T1 (control)	1.21±0.04 B	1.52±0.26 A	1.21±0.10 B	1.54±0.07 A	1.44±0.22 A
T2 (1g/kg)	1.22±0.08 B	1.41±0.20 A	1.21±0.09 B	1.42±0.11 A	1.42±0.17 A
T3 (3g/kg)	1.23±0.09 B	1.39±0.15 A	1.11±0.03 AB	1.21±0.08 B	1.21±0.12 B
T4 (5g/kg)	1.18±0.02 B	1.35±0.09 A	1.11±0.02 AB	1.37±0.19 B	1.44±0.13 A

Means with a different letter in the same column are significantly different (P<0.05)

4-5 Effect of *plantago lanceolata* seed on AST and ALT :

The results are shown in table 4-5, where a high concentration of AST (215.80) was obtained in the second treatment (T2) and a low concentration of AST was observed in the fourth treatment (T4).Fourth treatment (T4) ALT results showed high concentration (31.96), whereas second treatment (T2) results showed low concentration (20.94).

Table (4-5) Effect of plantain seed (*plantago lanceolata*) on AST \AST and ALT\ALT(Mean ±SE)

Treatment	Means ±SE	
	AST	ALT
T1	180.15± 4.76 B	28.68± 1.32AB
T2	215.80± 9.53A	20.94± 0.65C
T3	189.14± 4.03B	24.52± 0.73BC
T4	153.16± 2.95C	31.96± 1.80A

Different capital letters denoted significant (P≤0.05) differences among levels of add *plantagolanceolata* seeds powder between AST , ALT

4.6 Effect *plantago lanceolata* seed on serum albumin , globulin and total protein levels.

Table (4-6) shows that the highest globulin levels were seen during the second treatment (T2), at (2.77), and the lowest during the third treatment (T3 at 2.04), with no statistical significance. While albumin levels were significantly higher in the fourth treatment (T4) (1.51), they were significantly lower in the second treatment (T2) (1.14). Table 3 displays the results of the experiment, showing that total protein was highest in the fourth treatment (T4), at 4.18, and lowest in the third treatment (3.45).

Table (4-6) Effect of add *plantago lanceolata* seed on globulin ,albumin and total protein (Mean ±SE)

Treatment	Means± SE		
	Globulin (g\dl)	Albumin(g\dl)	Total protein
T1	2.10± 0.21 A	1.11± 0.06 B	3.21± 0.27 C
T2	2.77± 0.26 A	1.14± 0.03 B	3.92± 0.14 AB
T3	2.04± 0.30 A	1.41± 0.02 A	3.45± 0.23 BC
T4	2.66± 0.18 A	1.51± 0.11 A	4.18± 0.18 A

Different capital letters denoted significant (P≤0.05) differences among levels of globuline , albumin and total protein of add *plantago lanceolata* seed powder **.**

4-7 Effect of *plantago lanceolata* seed on Cholesterol , Triglyseride (HDL, VLDL, and LDL).

According to the data in table (4-7), cholesterol levels were significantly higher in the fourth treatment (T4), at 159.27, and significantly lower in the second treatment(T2), at 114.12.

In contrast, triglyceride levels were found to be significantly higher in the third treatment (T3) (121.53) than in the second (83.11).

VLDL levels were found to be significantly higher in the third treatment (T3), at (24.30), compared to the second treatment (T2), at (16.63).

However, we observed high levels of LDL in T4, recording (41.05), and low levels in T2, recording (26.11), and the results suggest that high levels of HDL were recorded in T4, recording (110.86), and low levels were recorded in T3, recording (99.57).

Table (4-7) Effect of add *plantagolanceolata* on level of s. cholesterol , Triglyceride, VLDL , LDL , HDL . (Mean ±SE)

Treatment	Means ±SE				
	Cholesterol	**Triglycerid**	**VLDL**	**LDL**	**HDL**
T1	122.57± 1.76 BC	85.57± 2.26 B	17.09± 0.52 B	29.98± 0.44 B	100.38± 3.11 C
T2	114.12± 2.59 C	83.11± 4.23 B	16.63± 0.95 B	26.11± 1.52 C	135.87± 1.63 A
T3	133.41± 1.25 B	121.53± 1.61 A	24.30± 0.85 A	27.72± 0.97 BC	99.57± 4.81 C
T4	159.27± 6.70 A	116.33± 1.94 A	23.62± 1.20 A	41.05± 0.61 A	110.86± 2.83 B

Different capital letters denoted significant (P≤0.05) differences among levels of add *plantago lanceolata* seed powder **.**

4.8 Effect of *plantago lanceolata* seed on blood urea and serum creatinine.

According to the data in tables (4-8), when *plantago lanceolata* was added to the diets of broiler chickens, the levels of blood urea and creatinine were reduced in (T2) and increased in(T3), respectively. Serum creatinine concentrations were found to be significantly different across treatments, with T4 having a high concentration of (0.42) and T3 having a low concentration of (0.37), as shown in the same table.

Table(4-8) effect of plantain seed (*plantago lanceolata*) on Blood urea and Serum creatinine . (Mean ±SE)

Treatment	Means ±SE	
	Blood urea	S.creatinine
T1	11.45± 0.38 B	0.38± 0.01A
T2	11.10± 0.40 B	0.39± 0.02A
T3	15.92± 0.19A	0.37± 0.02A
T4	12.03± 0.55 B	0.42± 0.01A

Different capital letters denoted significant (P≤0.05) differences among levels of *plantagolanceolata* seeds powder between blood urea and s.creatinine

4-9 Effect of *plantago lanceolata* seed on vaccine Newcastle and Gomboro disease

Tables (4–9) show the effects of adding *plantago lanceolata* on Newcastle disease (ND) and Gomboro disease (IBD), with high levels of both disorders seen in the third treatment (T3) and low levels seen in the fourth treatment (T4). Table 6 shows similar results for ND, with high levels seen in the second treatment (T2) (8.14), and low levels seen in the fourth treatment (5.77).

Table (4-9) effect of add *plantago lanceolata* seed on antibody titer against newcastle vaccine and Gomboro vaccine :

Treatment	**Means±SE**	
	IBD	**ND**
T1	12.24± 0.28A	7.69± 0.54A
T2	10.34± 0.44B	8.14± 0.61A
T3	11.55± 0.59AB	7.70± 0.12A
T4	8.74± 0.42C	5.77± 0.61B

Different capital letters denoted significant (P≤0.05) differences among levels of *plantago lanceolata* seeds powder **.**

4-10 Effect of *Plantago lanceolata* on Fibresshia, Spleen, and Liver Indices .

Tables (4–10)show that for the fibrosis index, a high value of 0.104 was recorded for Treatment 2 (T2), while a low value of 0.081 was recorded for Treatment 4 (T4); however, for the spleen index, a high value of 0.141 was recorded for Treatment 3 (T3) and a low value of 0.124 was recorded for Treatment 2 (T2); finally, for the liver index, a high value of 0.141 was recorded for Treatment 3

Table (4-10) Effect of add *plantago lanceolata* seed on indexes of Fibresshia , spleen and liver (Mean ±SE)

Treatment	Means±SE		
	Fibresshia index	Spleen index	Liver index
T1	0.144± 0.01A	0.119± 0.01A	2.26± 0.09A
T2	0.104± 0.01A	0.124± 0.02A	2.45± 0.12A
T3	0.087± 0.009A	0.141± 0.004A	2.26± 0.05A
T4	0.081± 0.02A	0.124± 0.007A	2.17± 0.08A

Different capital letters denoted significant (P≤0.05) differences among levels of Fibreshia , spleen , liver indexes .

4-11- Histomorphological of the liver and intestine

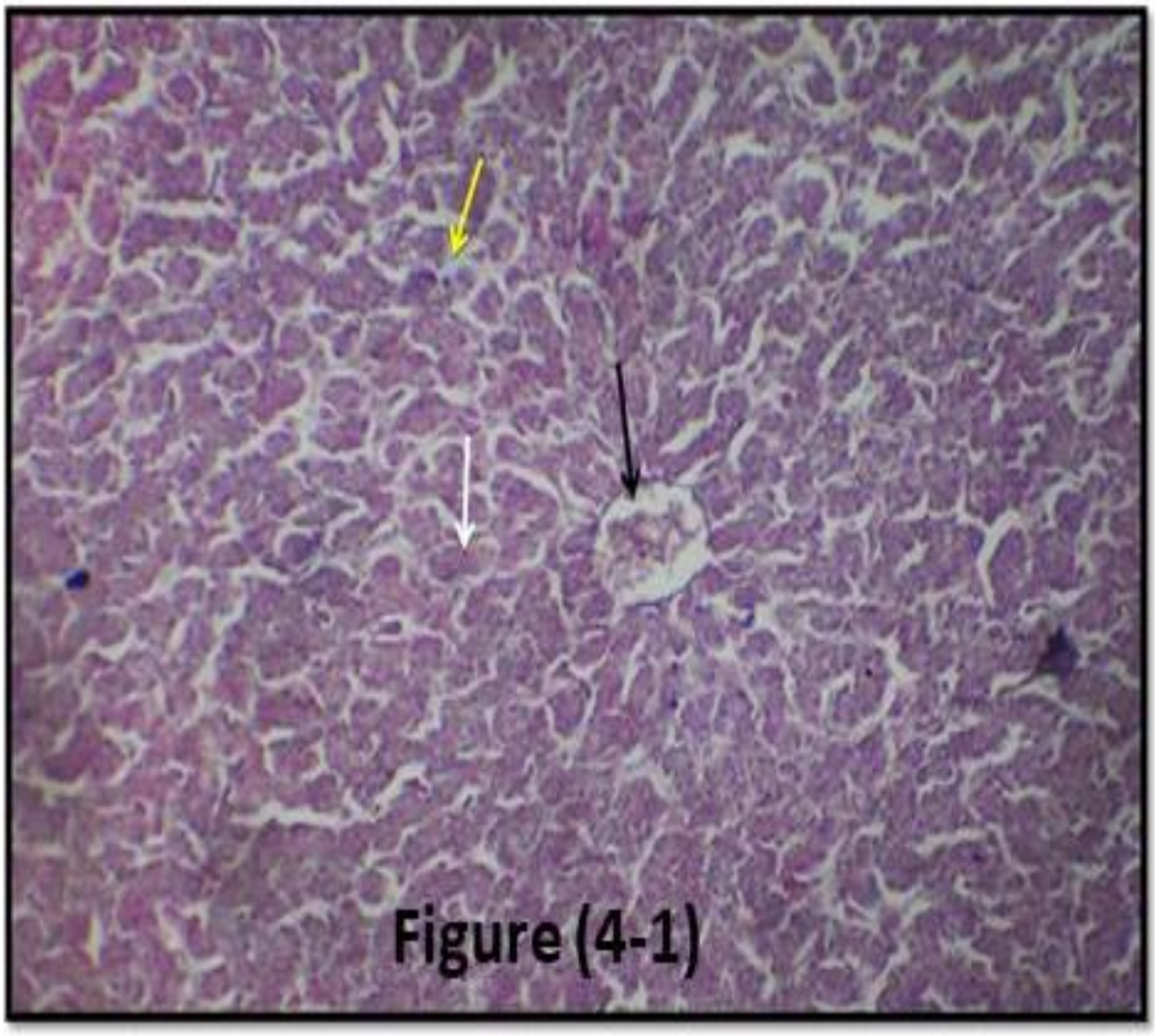


Figure (4-1) is a photomicrograph of a liver tissue section taken from a control group broiler chicken. The tissue demonstrates significant normal architectural histology, including normal hepatocytes with normal rounded nuclei (white arrow), slightly dilated sinusoids separating hepatocytes lobules (black arrow), and significant normal hepatic capsule surrounding the tissue (yellow arrow). (H & E, 40X)

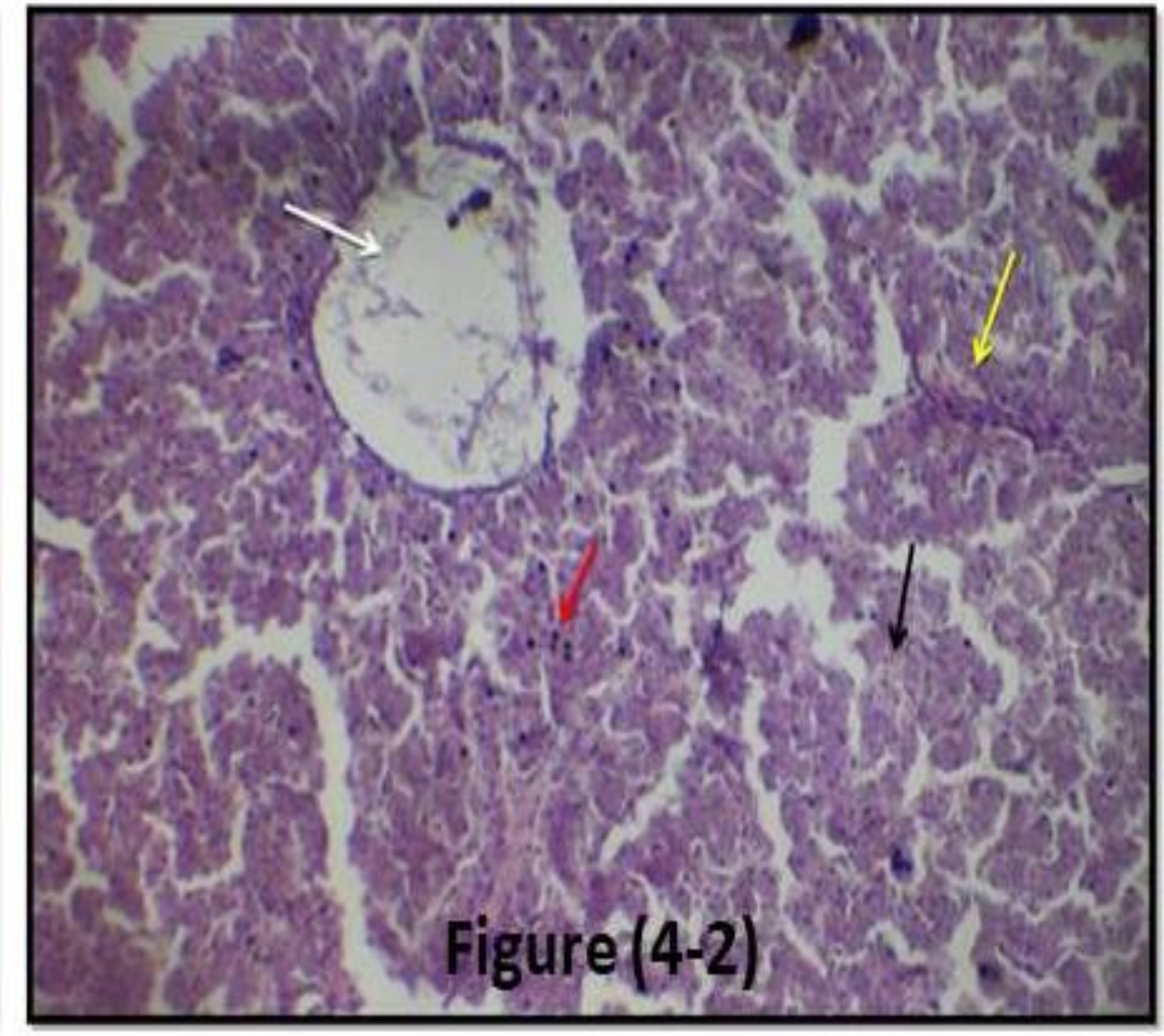


Figure (4-2) is a photomicrograph of a section of liver tissue taken from broiler chickens fed a diet containing 1 gm of *plantago lanceolata*. The image shows mild necrotic changes of hepatocytes, as evidenced by slight hepatic nuclear pyknosis (red arrow), as well as changes in the normal arrangements of hepatocytes (black arrow). —(H and E,10X).

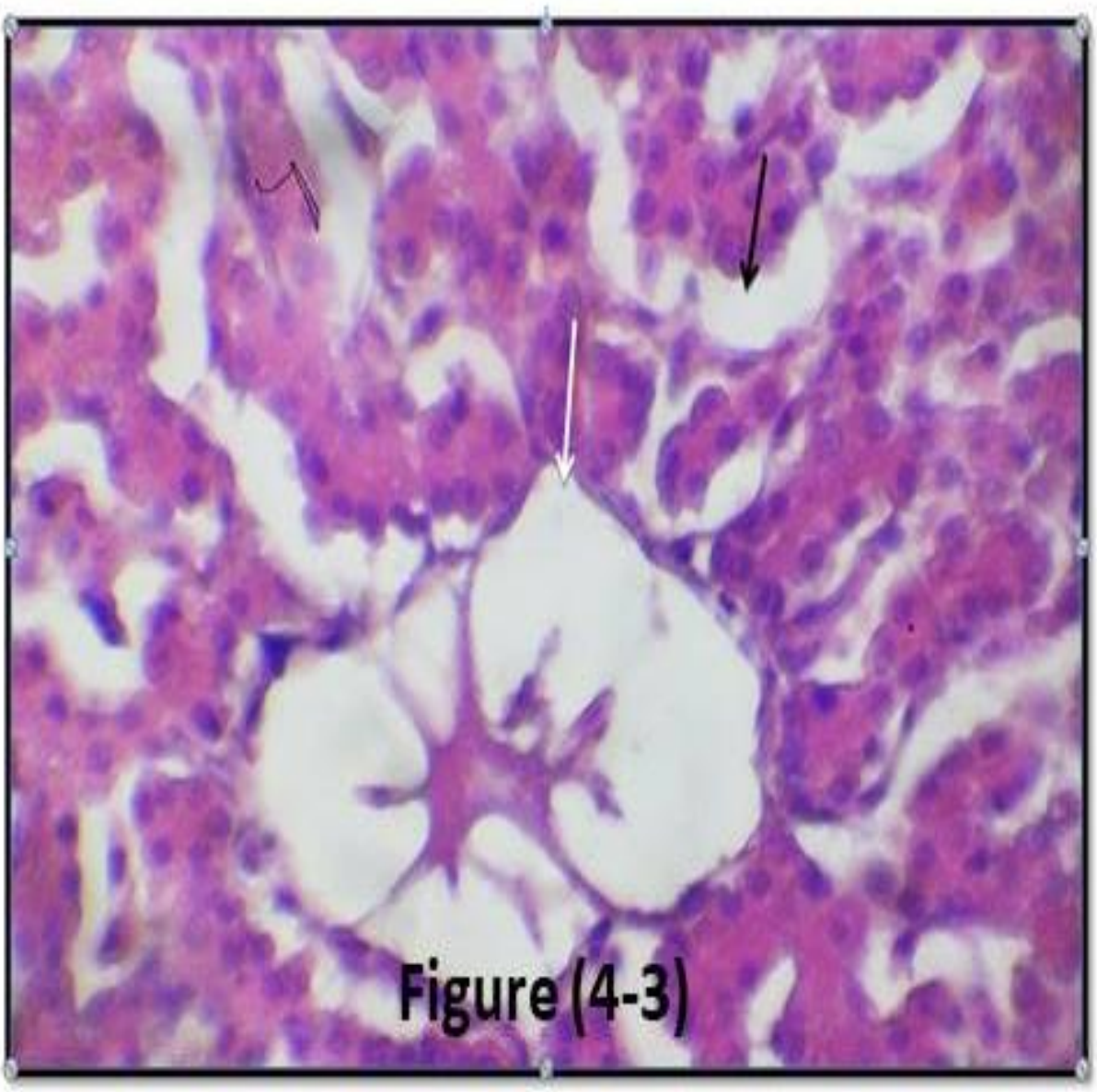


Figure (4-3) is a photomicrograph of a portion of liver from a broiler chicken fed a meal containing 3 gm of *Plantago lanceolata*. The photomicrograph reveals modest dilatation of the central vein (white arrow) and mildly dilated sinusoids dividing hepatocyte lobules (black arrow). (H and E, 40X).

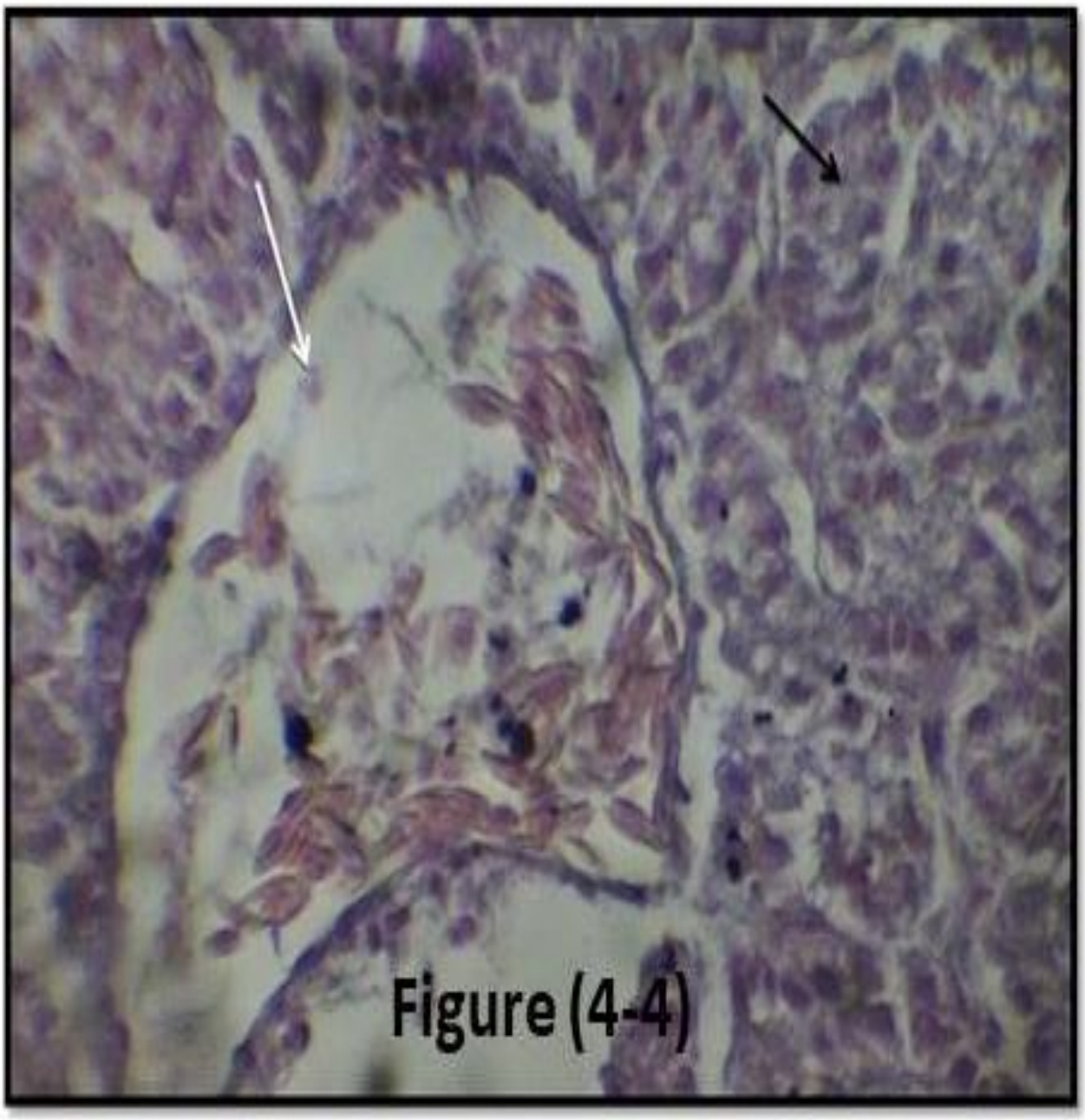


Figure (4-4)Photomicrograph of liver tissue slice from broiler chickens fed a meal containing 5 gm of Plantagolanceolata, revealing moderate to severe central venous congestion and dilatation (white arrow) and some degenerative alterations of hepatocytes (black arrow) (Figure 4-4). (H&E, 40X).

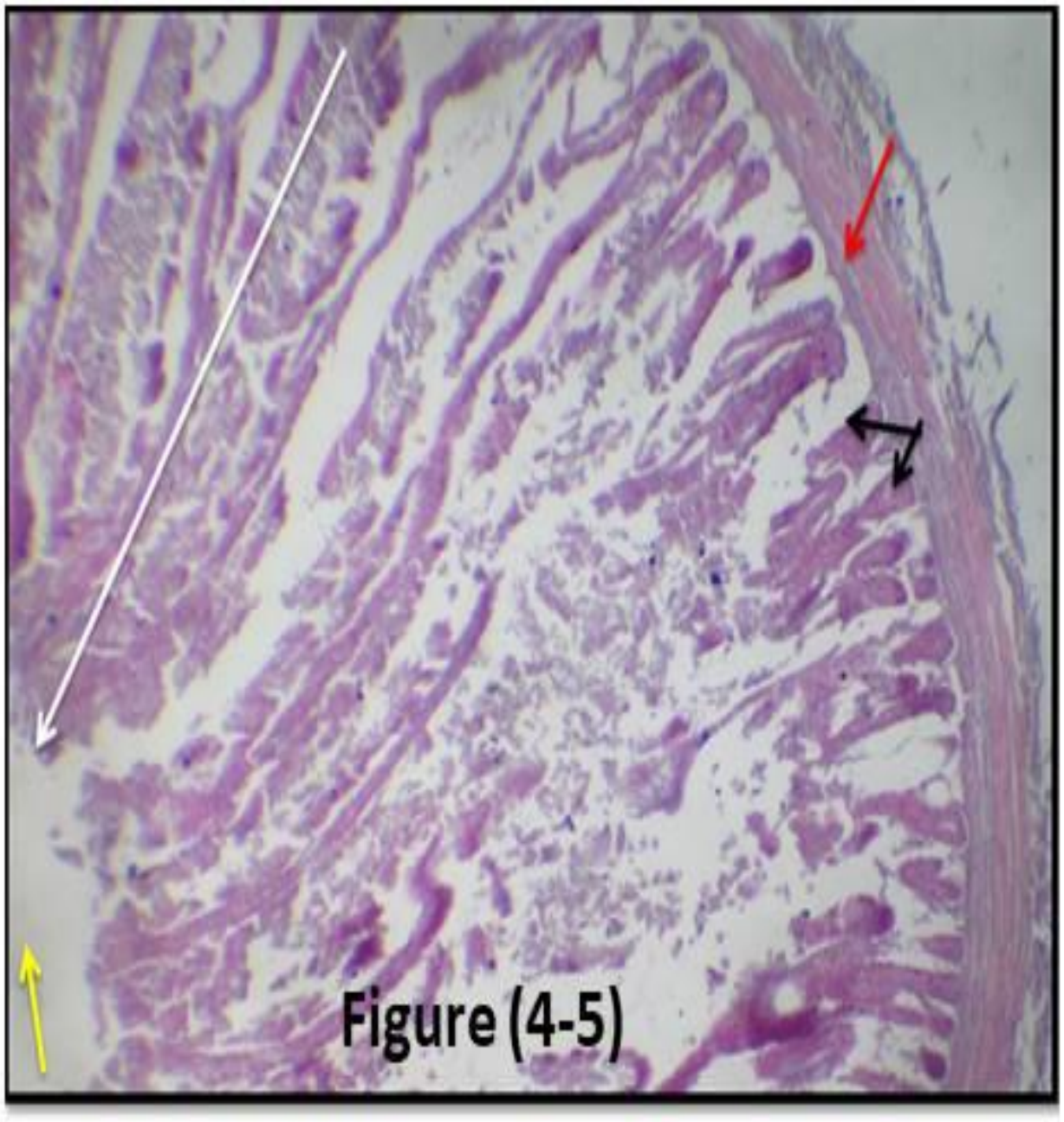


Figure (4-5) is Photomicrograph of transverse section of intestinal tissue from control group broiler chicken, showing significant normal architectural histology, represented by apparently normal height villi with blunt end (white arrow) radiating towards the lumen (yellow arrow), based with normal glands of intestine (Lieberkuhn glands)(black arrow), normal tunica muscularis and serosa(red arrow). (He and E,4X)

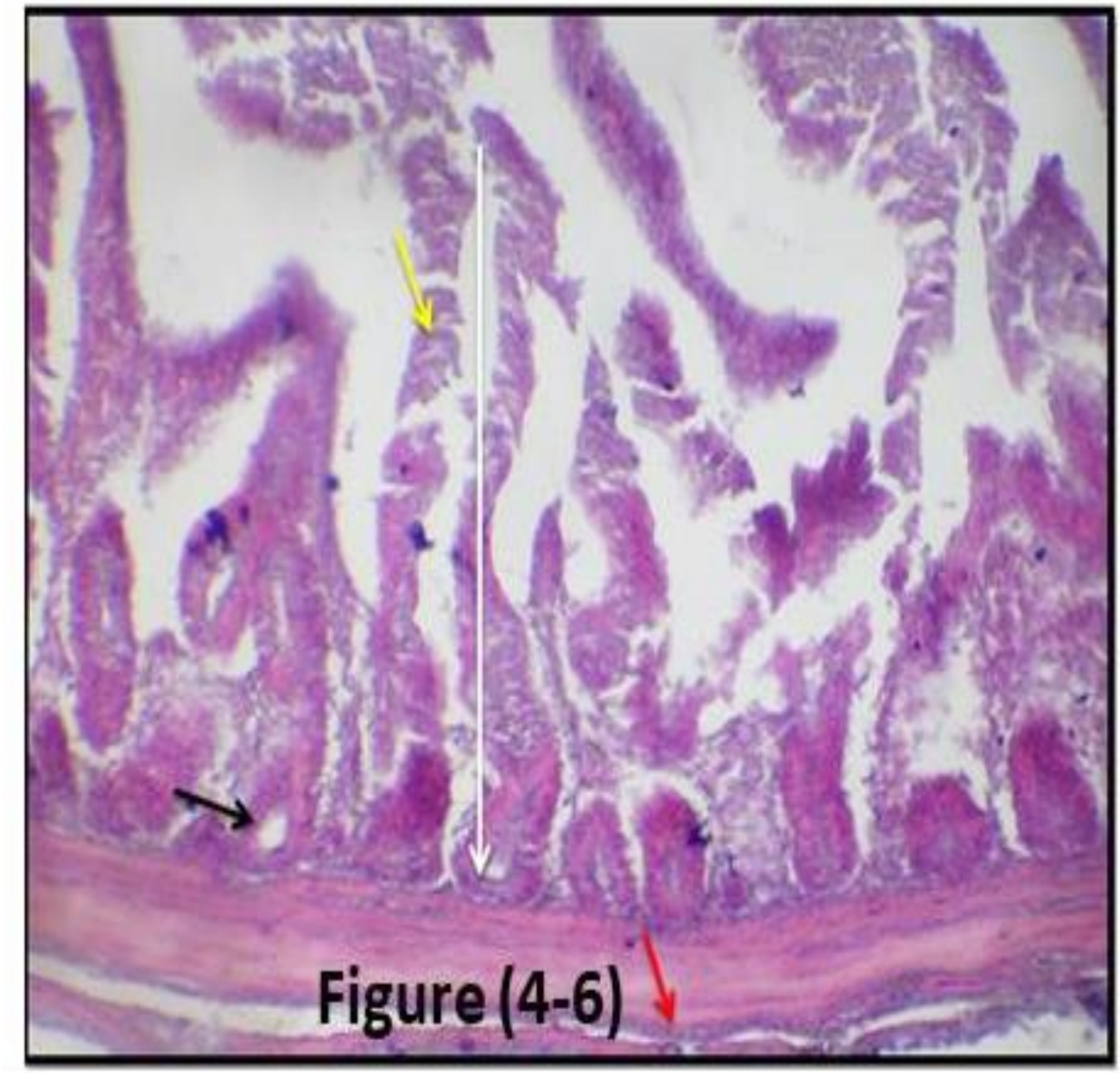


Figure (4-6) is a photomicrograph of a transverse section of intestinal tissue from a control group of broiler chickens, demonstrating significant normal architectural histology as evidenced by normal villi with blunt ends (white arrows), remarkable normal crypts (yellow arrows), normal villous glands of intestine (Lieberkuhn glands) (black arrows), and normal tunica muscularis and serosa (red arrows). The formula is (H and E,10X).

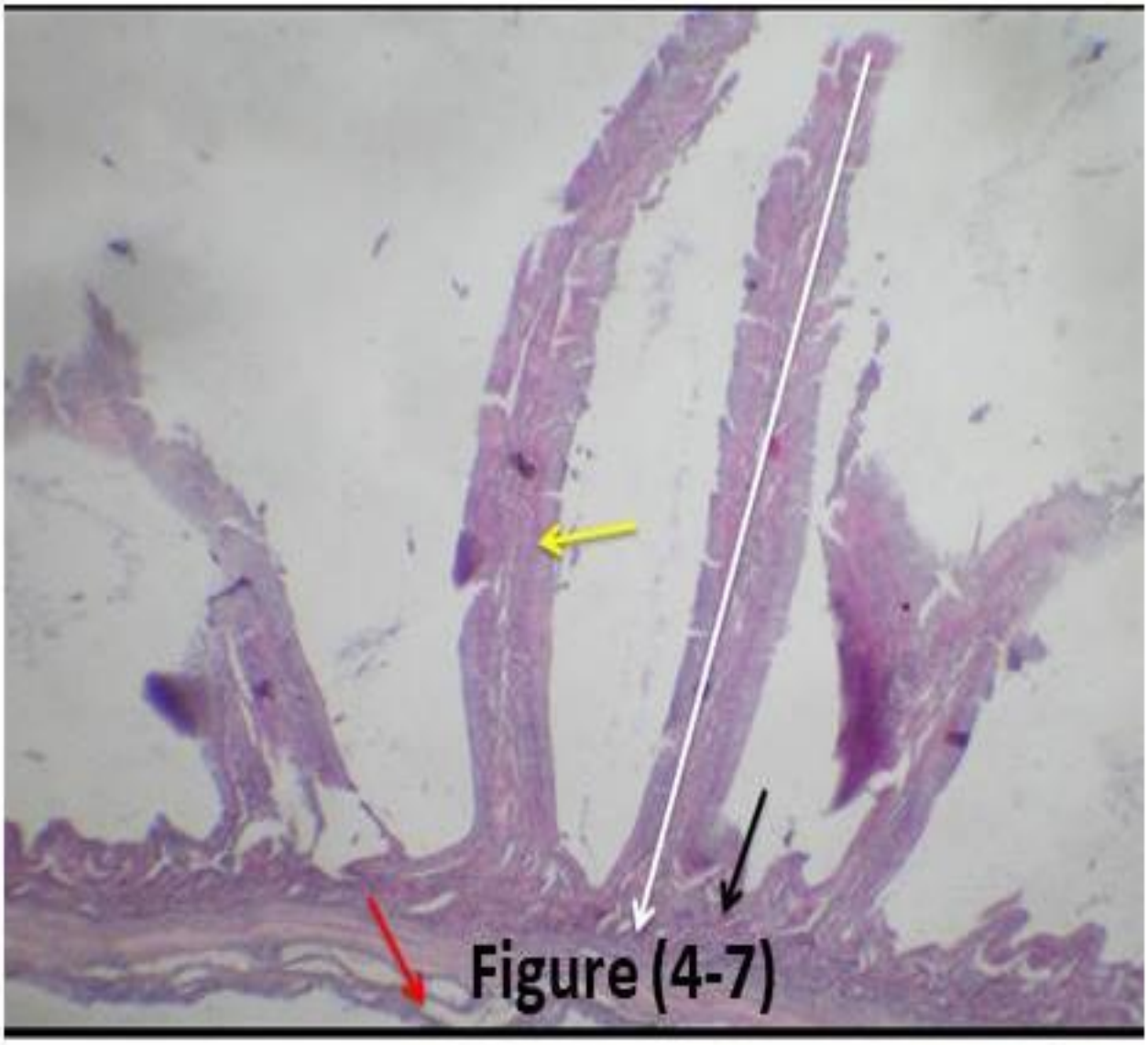


Figure (4-7) is a photomicrograph of a cross-section of intestinal tissue taken from a broiler chicken fed a diet containing 1 g of *Plantago lanceolata*. The villi appear to be of normal height, and their tips are closed and pointed, but the crypts and intestinal glands are elongated, and the tunica muscularis and serosa are slightly thickened. ...(H and E,4X).

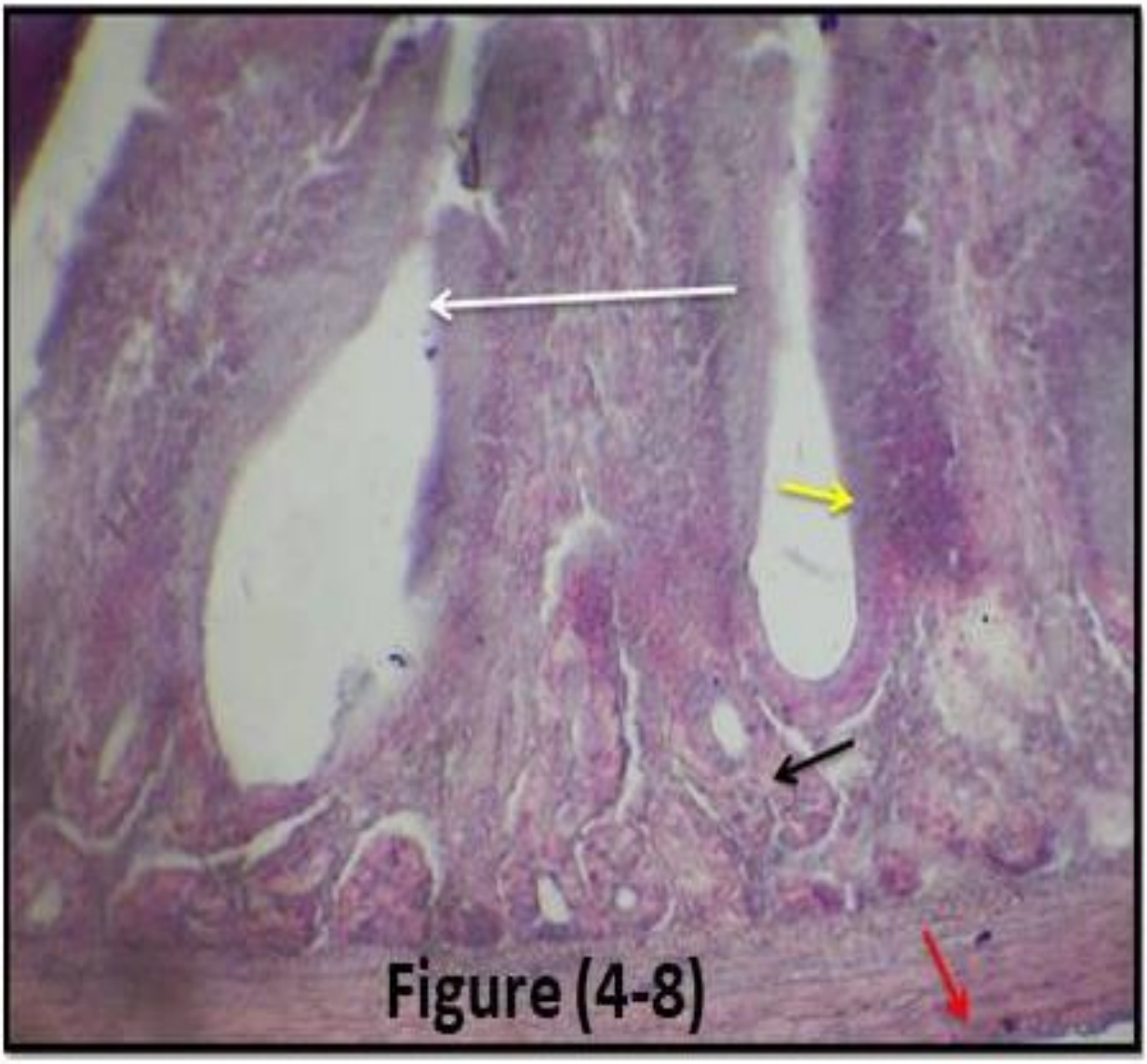


Figure (4-8) is Micrographs of bowel tissue circumferential section from 1 gm added *Plantago lanceolata* to diet group broiler chicken, revealed mix of different in architecture and design histology of villi, represented by apparently normal height villi with slight increase in width(white arrow) normal crypts (yellow arrow) based with elongated intestinal glands with hyperplasia of their linings (black arrow), slight depth in tunica heavily muscled is suggests hypertrophy. The formula is (H and E,10X).

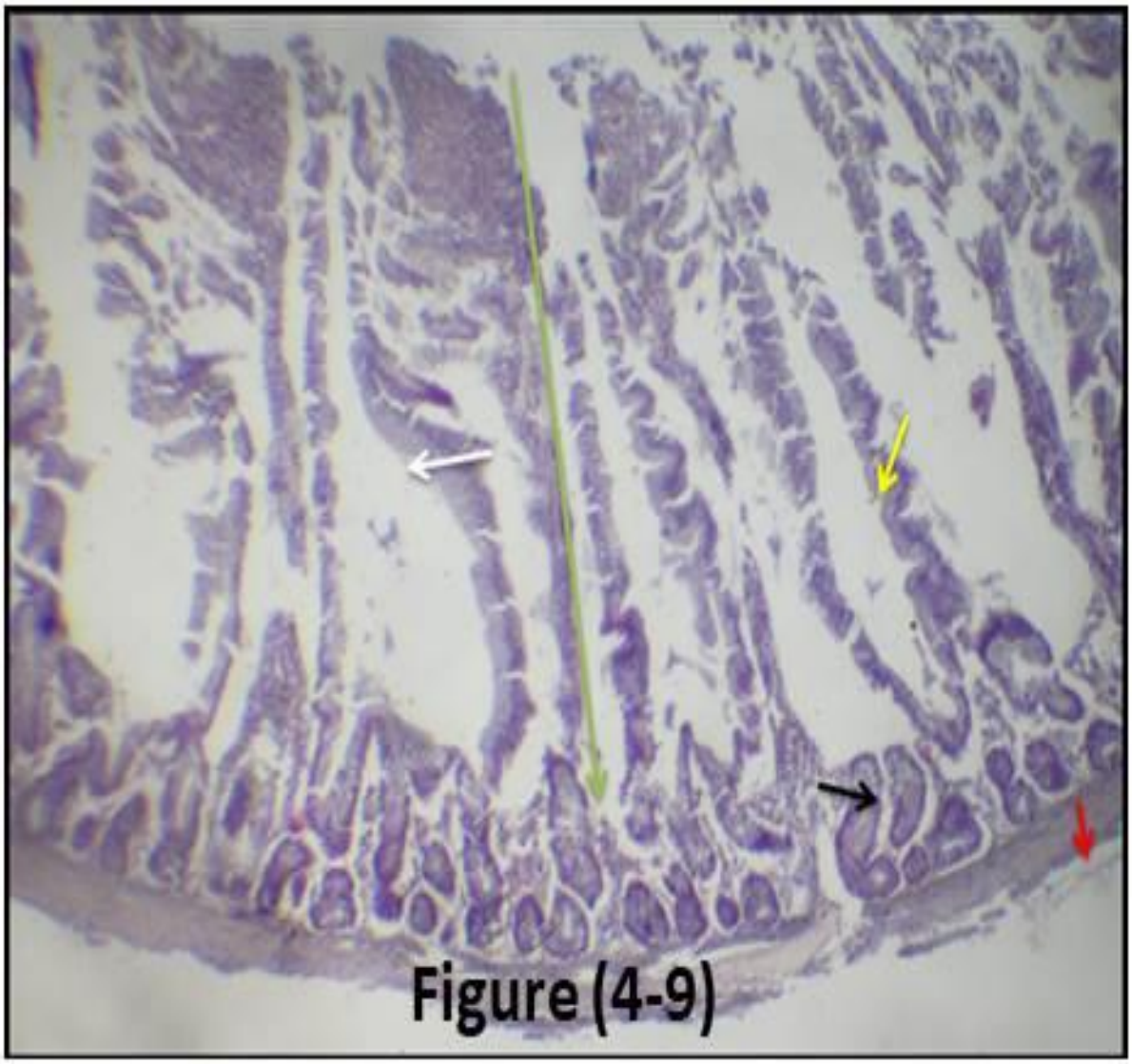


Figure (4-9) is a photomicrograph of a transverse section of intestinal tissue taken from a broiler chicken's diet after 3 gm of *Plantago lanceolata* had been added to the diet. The villi appear to have increased in height while decreasing in width (green and white arrows, respectively), and the crypts have shrunk in size (yellow arrows). The intestinal glands and the thickness of the tunica muscularis are both normal. H and E, 4X.

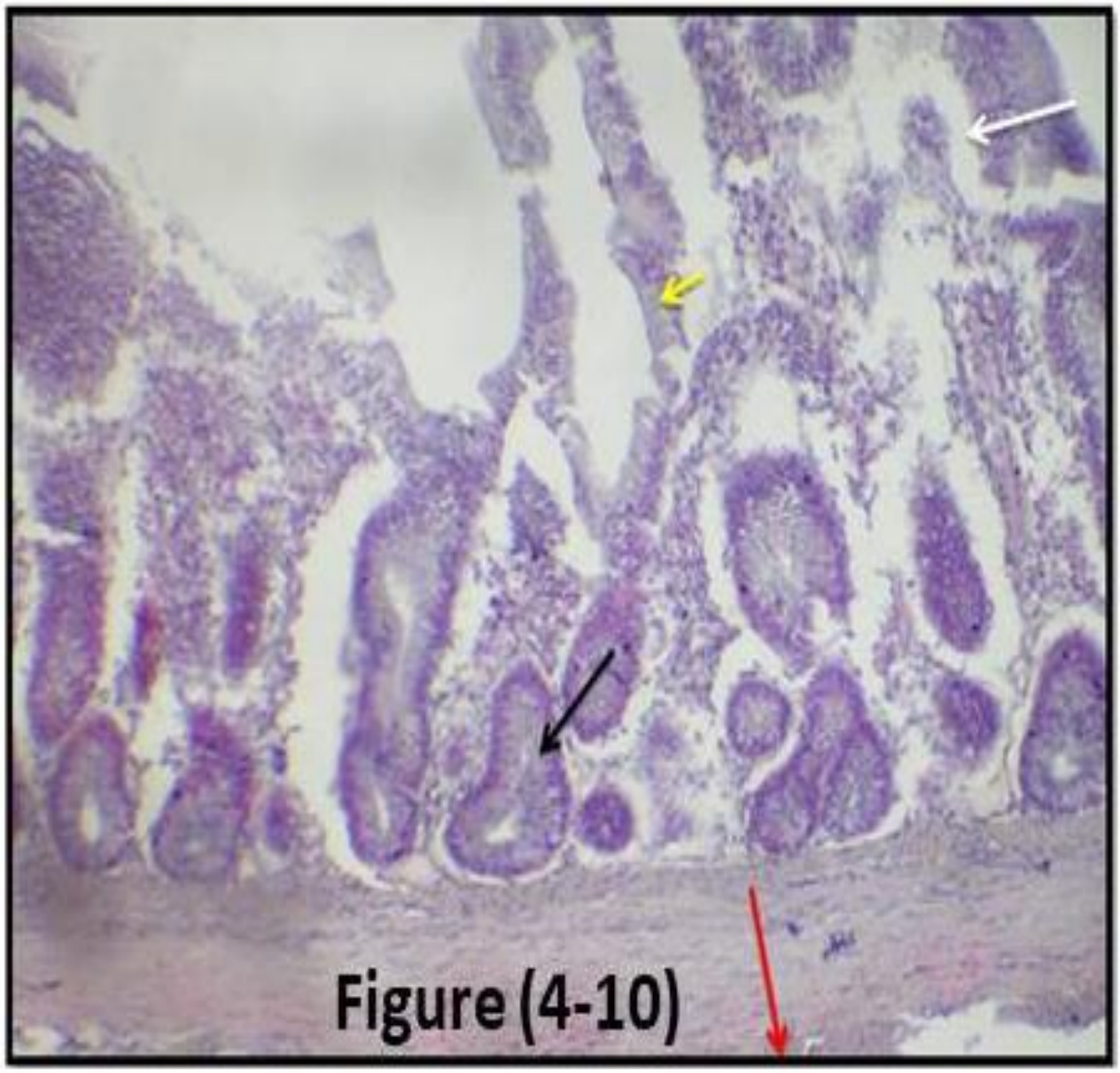


Figure (4-10) is a Photomicrograph of transverse section of intestine from broiler chickens fed a diet containing 3 gm of *Plantago lanceolata* shows mild to moderate changes in architectural histology of intestine, including a significant narrowing of villi (white arrow) and a reduction in the size of crypts (yellow arrow), as well as normal intestinal glands with hyperplasia of their linings (black arrow) and a slight to normal —(H and E,10X).

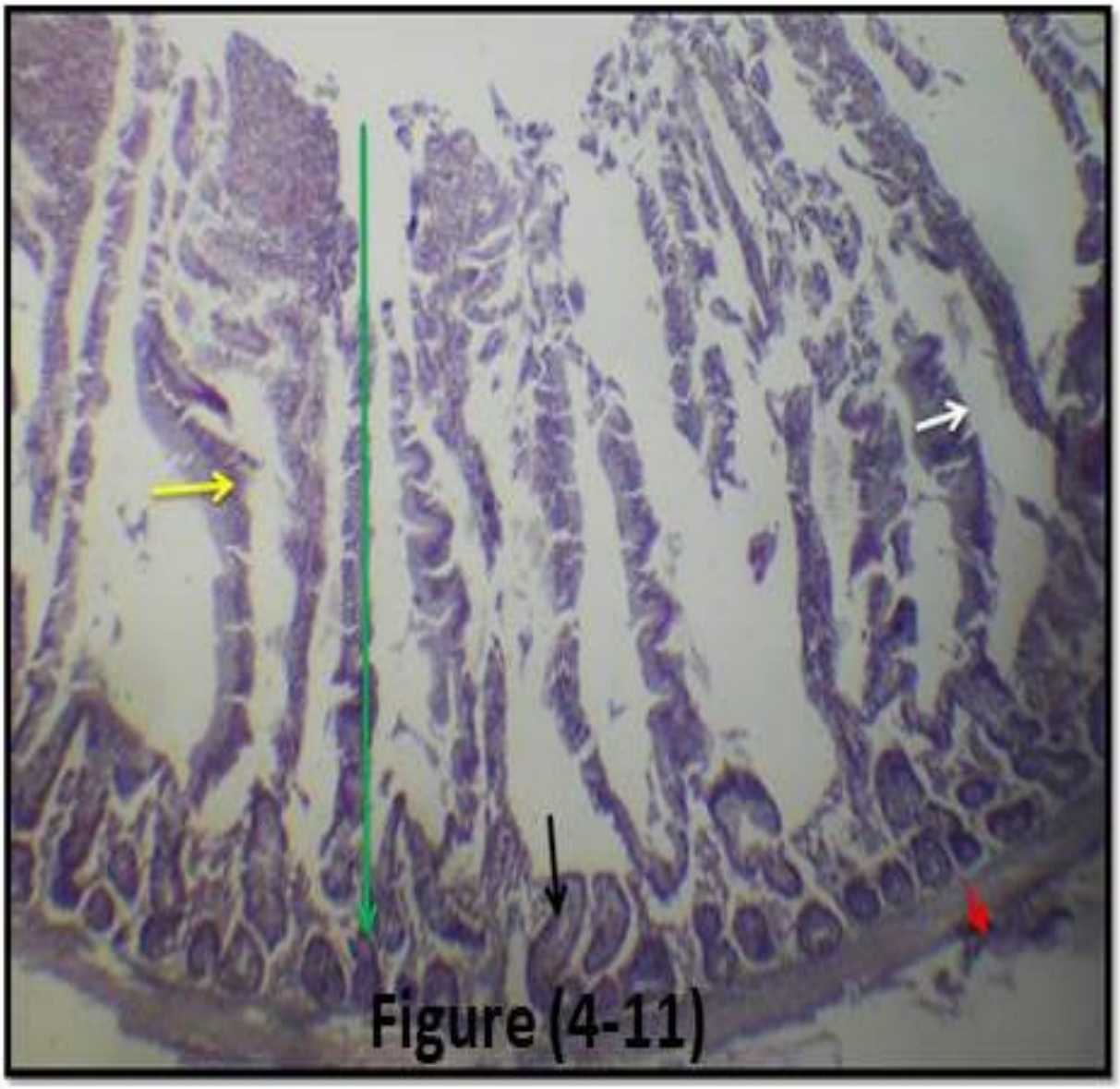


Figure (4-11) is a Photomicrograph of transverse section of intestine from broiler chickens fed 5 gm of *Plantago lanceolata* found mild changes in architectural histology of villi, including an apparent increase in height with blunt ends (green arrow) and a decrease in width (white arrow), as well as normal crypts (yellow arrow), normal intestinal glands with increasing numbers (black arrow), and normal thickness in tunica muscularis (red arrow). H and E, 4X.

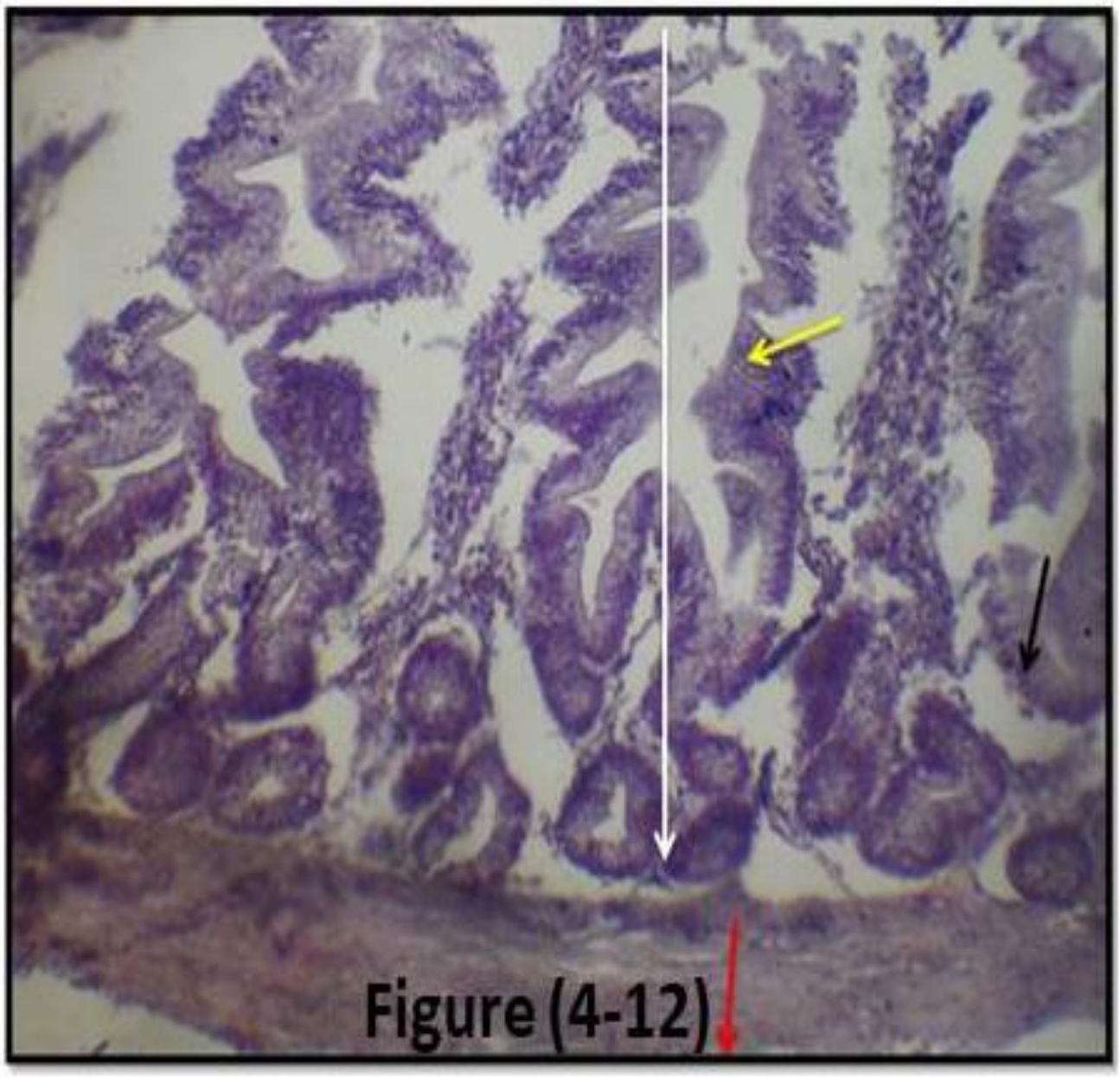


Figure (4-12) is a photomicrograph of a transverse section of intestinal tissue taken from a broiler chicken fed a diet containing 5 g of *Plantago lanceolata*. The image shows significant villi folding as a result of the increased length of the villi (white arrow), normal crypts (yellow arrow), normal intestinal glands with slight hyperplasia of linings (black arrow), and slight to normal thickness in the tunica muscularis —(H and E,10X).

Chapter Five: Discussion

5-Discussion

5-1 Effect *Plantago lanceolata* seed on weekly live body weight (g) :

Experimental results suggest that adding plantain to the diet improves average live body weight by stimulating the production of digestive enzymes to the plantain's high fiber content, all of which aid in the more efficient absorption of nutrients in the gastrointestinal tract (El-Aal. *et al*., 1986).

Poultry health and productivity may be improved by using medicinal plant extracts that contain active chemicals that inhibit the development of pathogenic microbes in the intestines (Zhain, 2013).

Supplemental therapies that include *plantago lanceolata* perform better since it provides vitamins and mineral components necessary for cellular development (Dixon, 1976 ;Blumenthal, 2003). The results were agree with those of (Kalia *et al*., 2017) about the effects of adding plantain on body weight increase, which varied significantly across all plantain-added treatments. Body weight and weight increase reduced dramatically and were proportionate to the rates of birds in the studies, contradicting the findings of the research by (Arbouche *et al*., 2012) on the effect of adding *plantago lanceolata* to the fattening diets of broilers and its influence on growth.

While the average live body weight of broiler hens did not change significantly across diets with varying concentrations of plantain powder, as shown by the findings (Yildirim *et al*.,2013). Similar to what was found by (Abuirmeileh, Muwalla,1990), we found that supplementing the broiler diet with *plantago lanceolata* improved the animals' body weight. This is likely due to the *plantago lanceolata's* vitamin and mineral content, as well as its flavonoid compounds, the action of which is similar to that of steroid hormones (Harborn *et al*., 1975). This has the effect of speeding *(Sturkie , 2000)*

5-2 effect of *plantago lanceolata* seed on weekly weight gain(g) .

As shown by the findings, *plantago lanceolata L.* seed significantly contributed to the development and well-being of hens by improving their capacity to digest and absorb the content of nutrients. It also had a favorable influence on activity and increased digestive enzymes.

These findings corroborate those of (Gollapudi *et al,*. 1995), who reported that *plantago lanceolata* seed possesses antioxidant, anti-fungal, and antibacterial properties. These beneficial effects, in turn, have been linked to the presence of pinocamphone, iso-pinocamphone, and -pinene, all of which aid in the production of digestive enzymes.

Plantago lanceolata seeds, in particular the phenolic chemicals and phenol that give it antiseptic capabilities, were linked to a lower body mass index in another research (Koudou *et al*., 2005).

5-3 Effect of of *plantago lanceolata* seed on Feed intake :

Plantago lanceolata seed caused a decrease in feed conversion ratio with increasing body weight after all several herbal plants cause provides some compounds that promote digestion and absorption of some nutrients in these diets, the results of the present study showed different values for feed intake and feed conversion ratio value.

They found that the increased metabolic demand for feed caused by plantago seed's rapid development and poor feed conversion ratio is associated with an uptick in metabolic diseases such as ascites in broiler chickens (Fathi *et al*., 2016)

The rate of development of broiler chickens has almost doubled in the previous two decades, but the expansion of oxygen-supplying organs, especially the heart and lung, has not kept pace with muscle growth. An imbalance between the expansion of organs that use oxygen and those that provide it (the heart and lungs) has been related to the rising incidence of ascites metabolic abnormalities in broiler chickens (Havenstein, 2003).

Weight increase, carcass quality, and survival rates have all been proven to improve when particular volatile oils are added to chicken diets (Williams and Losa , 2001) Additionally,

Some studies have shown that the volatile oils and acids found in herbal extracts have antimicrobial characteristics in the intestinal lumen and stimulate early-stage development in pigs and broilers (Manzanilla *et al*., 2004). (Feng *et al*., 2007).

Extracts from plants including flowers, buds, herb seeds, leaves, twigs, bark, herbs, wood, fruits, and roots are what make up phytogenic feed additives (PFA) (Burt,2004). A wide variety of physiological effects, such as secretolytic and spasmolytic or immune - stimulative, is produced by the active molecules, which include many distinct secondary plant metabolites (Lee *et al*.,2004) Broiler performance has been reported to have improved significantly by some authors (Ertas *et al*., 2005; Cross *et al*., 2007); nevertheless, other writers have reported no changes in broiler body weight increase or feed consumpton (Lee *et al*.,2003) also known as the feed conversion ratio ((Jamroze *et al*.,2005; Ocak *et al*.,2008 and Nasir and Grashorn, 2010).

Possible causes for this variation include changes in plant species, used plant parts, harvest season, PFA preparation technique, and compatibility with other feed additives (Jang *et al*., 2007). Antibacterial, antiviral, and antioxidant effects have been shown in plant extracts (; Platel and Srinivasan, 2000; Williams and Losa, 2001 and Brenes and Roura, 2010), and plant extracts have been demonstrated to alter digestion and digestive enzyme production (Prakash *et al*., 2010). However, there is a dearth of studies that examine how PFA alters the digestive tract structure of broiler chickens.

Vitamin A-rich plantago lanceolata L. increased the BW and feed efficiency of Japanese quails (Kucuk and Shahin, 2003), who found that adding ascorbic acid to the diet improved avian performance, nutrient digestibility, and the birds' ability to absorb nutrients.

5-4 Effect of *plantago lanceolata* seeds on AST and ALT levels.

In this study, the different addition levels of *plantagolanceolata* had no effect on the levels of these two enzymes, suggesting that the birds were not negatively affected by the addition of *plantagolanceolata* and that there was no stress factor, either nutritional or administrative, responsible for the observed number of mortalities. In addition, he shared that the typical AST enzyme activity in chicken is 124 U/L. Several researchers (Azor *et al*., 2010) when *plantagolanceolata* was included in the diet, researchers discovered that although the AST enzyme was unaffected, the ALT enzyme level dropped, and the results suggested that this

decline might be harmful to the cells, tissues, and organs. the result agrees with (Khadiga, *et al*., 2008) where they found a significant increase in the concentration of AST when the birds were fed, and with (Oyelola, *et al*., 2004) where they found a similar result, attributing the high level of AST enzyme to feeding with high levels of crude protein, and concluding that the AST enzyme is used to determine the health status of the liver.

The rise in treatments is due to the main breakdown of protein in birds, and the tissue content reflects nutritional status, while the decrease in protein during heat stress is the result of protein catabolism caused by an increase in cortico sterone in the blood plasma and the formation of glucose from non-carbohydrate sources.(Al-Hassany ,2006) ،as well as the slant of protein illustration.

5-5 Effect of *Plantago lanceolata* seeds powder on albumin , globulin and total protein .

The results of this study showed that reduction of the mean values of albumin , globulin and total protein table (4-6) .

These results are in agreement with AL-Salih *et al*., (2013) and Talib, (2016) who reported that decrease of the concentration of total protein , albumin and globulin in animals .

Abdul-Qader *et al*., (2013), Bakour *et al*. (2018) and Abdul Rahman *et al*., (2010) who noted the changes in some biochemical parameters such as total protein and albumin in oxidative status .

This depression in serum total protein may be due to increase of reactive oxygen species production, which are able to attack lipids, lead to peroxidation of lipid in cell membranes, then cellular dysfunction, further decrease protein synthesis (Rattan, 2006)

Free radical produce throughout oxidative stress are able to damage the peptide back bone of protein. this may be also lead to miss -folding and depression of protein (Khudair, 2010).

Sulfhydral group of serum protein including albumin , have been suggested to be an antioxidant substance in plasma (Medina- Navarro *et al*., 2014), thus produced after exposure may mediated protein oxidation and degradation of albumin leading to it's depletion (Roche *et al*., 2009).

Increase the corticosteon hormone secretion resulting from oxidative stress, that lead to increase the using of amino acids in gluconeogenesis (AL-Salih *et al*., 2013), the depression in insulin

secretion by high levels of free radicals causes gluconeogenesis (Ahmed, 2005; Manna *et al*., 2005).

Albumin level depression may be due to the protein losing nephropathy (Guyton and Hall, 2006). Our results disagreement with Obead *et al*., (2013) who indicated that no adverse effect on albumin concentration, and with Alol, (2012) who indicated to elevation in globulin concentration in status of oxidation stress .

In the current study, serum total protein , albumin and globulin concentration were increased in *Plantago lanceolata* seeds and suppressing the toxic effects on proteins . These results of this study are in agreement with Meligi and Hassan, (2017) who found that treatment with *Plantago lanceolata* reduced the detrimental effects of abamectin on some biochemical parameters as total protein, albumin and glubulin. Khalil *et al*.,(2015) reported that addition of *plantago lanceolata* seeds or leaves improving performance and some physiological responses such as albumin, globulin and cholesterol . Al-qasoumi, (2010) who observed increase the level of protein in treatment with *plantago lanceolata* seeds and it's protects role on liver , and Alrikabi, (2017) also observed increase total protein level in *plantago lanceolata* seeds.

Improvement in total serum protein may result from the ability of the effectives components in *plantago lanceolata* such as flavonoids to scavenge the effects of free radicals that causes the gluconeogenesis, hence reduce using proteins as a source of energy (Abdul-Rahman *et al*.,2010).

In the same line, El-Missiry and El-Gindy, (2000) indicated that the ability of *plantago lanceolata* to stimulate the regeneration of hepatic tissues, and increased protein synthesis in damaged liver and improved the functional status of the liver cells. In addition Al-Daraji and Razuaki, (2012) indicated that addition of rocket seeds in chicken diet led to improvement of blood plasma constituents.

Our results disagree with Al-Hassnawi, (2014) who observed no significant changes in total protein and decrease in albumin in *plantago lanceolata* seeds powder.

5-6 Effect of Plantago lanceolata seeds powder on S.Cholesterol , Trichyseride ,LDL,HDL and VLDL .

In table (4-7) the results of lipids profile in this study recorded elevation in serum TC, TAG, LDL and VLDL, and depression in HDL concentration treatment group.

These results are in agreement with many previous studies utilized to induce oxidative stress in poultry and another animals (AL-Maadhedyi, 2017) in broilers (Al-Mzaien, 2012) in rabbits , and (Hamad, 2013) in rats. This clears that the oxidation stress induces lipids metabolism disorders lead to lipid peroxidation that causes many diseases such as: cardiovascular diseases (Kelly and Fussell, 2017).

Several explanations for these changes in lipids metabolism attack the pancreatic βeta cells(insulin inhibition), and deficiency in lipoprotein lipase activity (the main enzymes catalyses triglycerides removal) (Nelson and Cox, 2005). Shi *et al., (* 2014) condensed the high levels of cholesterol attributed to decrease in 7-α- hydroxylase enzyme activity responsible for converting cholesterol to bile acid, thus accumulation and increase cholesterol levels, or may be due to oxidation of Apo-B 100 found on low density lipoprotein - cholesterol lead to LDL accumulation and increase total cholesterol level in plasma (Sobenin *et al*., 1996), disturbance of some digestion and absorption intestine process, and increase cholesterol absorption from intestine by increase cholesterol acyl transferase enzyme activity that stimulated by insulin deficiency, lead to increase in serum cholesterol levels (Hassan *et al.*,2000).

High level of triglycerides attributed to disturbance in cholesterol esters metabolism and deficiency in lipoprotein lipase activity (De-Man *et al.*,1996) , lipoprotein lipase deficiency prevents triglycerides removal from blood (Ibrahim and Kareem, 2014), ROS inhibits some enzymes responsible on triglycerides break down (Machoy-Mokrzynska *et al* .,1994; Betteridge ,2000).

Increase malondialdehyde level resulting from Oxidative stress mostly associated with increase LDL in serum because converted LDL to the oxidative form (Lesgards *et al*., 2002).

High density lipoprotein of cholesterol HDL the main cholesterol transporter from body tissues to the liver, in oxidative stress ,when increase reactive oxygen species, increase LDL oxidation and cholesterol level in the body lead to diminishing serum HDL concentration (Cipollone *et al*., 2003; Vijayalakshmi and Chandrasekhar, 2008). Suppression in HDL concentration also might obtained by increase cholesterol ester transferase activity (transfers cholesterol esters from HDL

to VLDL leaving cholesterol of HDLrich with the triglycerides and less affinity to the Apo-A, so HDL remains free , and facilitating it's filtration from kidney (Betteridg, 2000).

In the same time, the results of lipids profile in *Plantago lanceolata* seeds powder in this study showed decrement of TC, TAG , LDL and VLDL cholesterol levels, in contrast of HDL levels in blood serum, so improvement of these parameters levels .

These results are in agreement with (Hussein *et al.*, 2010) and (El-Nattat and El-Kady ,2007).

The reasons of TC, TAG , LDL and VLDL lowering may be due to high content of unsaturated fatty acids oil (%85) such as linolic and linolinc acids El-Gengaihi, *et al*., (2004) noted decrease serum cholesterol levels ,when treatment with *Plantago lanceolata*.

Several studies indicated that eating high containing diets of Mono unsaturated fatty acids or poly unsaturated fatty acids lowering cholesterol levels in blood (Rivellese *et al*., 2003; Covas *et al*.,2006). So the depression in serum cholesterol level in *Plantago lanceolata* treatment may be results from presence of B-sitosterol compound that compound reduces cholesterol intestine absorption, then reduce it's concentration in blood(AL-Khazragi, 2009)

flavonoids are capable to decrease hydroxyl – methyl – glutaryl – CoA reductase enzyme activity. (responsible on converting B-hydroxyl – B, methyl glutaryl – CoA to movalonic acid) and determined cholesterol biosynthesis in hepatic cells(Bulbul *et al*., 2009; Aldulaimi, 2018).

On the other hand, vit C and carotenes in *Plantago lanceolata* seeds powder also have a role in a decrease of cholesterol levels, because these vitamins amelioration the function of thyroid gland (Rinzler, 1990; Barillari *et al*., 2005), thyroid hormones have an important role in the controlling of cholesterol biosynthesis and ability of liver to explusion of cholesterol in bile, high thyroid gland activity leads to decline cholesterol levels in serum blood (Kuhn *et al*., 1993)

Possible cause of reduction of serum triglycerides level for the presence of the vit E, that prevents oxidation of lipids in liver cells membranes, thus decrease triglycerides levels in blood (Al-Maadhedy, 2017; Zeweil *et al*. ,2015), or the reason may be due to presence the fibers in *Plantago lanceolata* that stimulate lipoprotein lipase enzyme (responsible on triglycerides hydrolysis) and fails triglycerides concentration in blood (Adisakwattana *et al.*, 2012). Vitamin E provides LDL protection against oxidation by hydroxyl groups and donner hydrogen atom to free radicals to prevents lipid peroxidation, and increase HDL cholesterol level in plasma (Puthpongsiriporn *et al.*, 2001).

The effect of *Plantago lanceolata* in a decrease of lipid levels may result from presence of phenols compounds, rich phenol diet (is superior to the other anti-oxidants) because it works on increase lipoprotein lipase activity and remove triglycerides from plasma (Dai and Mumper, 2010)

Saponine one of the *Plantago lanceolata* seeds containing (Marwat *et al*.,2016) hydrolyse to the diosgenin and sapogenin in gut, saponine with cholesterol compose insoluble complexes in digestive tract inhibit intestine cholesterol absorption (Petit *et al*.,1995; Sauvaire *et al.*,1996).

5.7 Effect of plantain (*plantago lanceolata*) seeds on blood urea and creatinine levels.

Broiler chicks given plantago had significantly higher blood urea and creatinine levels than the control group.Our study's results corroborate those of (Al-Duri, 2016) and (Al-Fahdawi, 2018).

A rise in blood levels of creatinine or urea indicates a problem with the kidney's ability to filter out waste products (Al-Okbi *et al*., 2014), making these tests useful diagnostic tools for evaluating renal function.

A gradual negative alteration in renal function resulting in high blood urea (uremia) and creatinine levels (Bartosikova, 2003) is characterized by chronic complications in the body, such as diabetic nephropathy. The elevated levels of these parameters in this study are evidence of the effect of *plantago lanceolata* on kidney efficiency in (filtration and reabsorption) of blood urea and creatinine (Ishimura *et al*., 1998; Roche *et al*., 2009)

Because *plantago lanceolata* treatment causes oxidation of lipids and proteins, namely the lipid of the plasms membrane of renal tubules cells, this may increase the flow of blood urea and creatinine from kidney tissues into the blood stream, leading to elevated creatinine and urea levels (Al-Taai,2015).

Additionally, treatment groups with *plantago lanceolata* seeds had significantly lower mean values of blood urea and creatinine levels. (Hassan, 2016) found similar outcomes when protecting against oxidative stress using *plantago lanceolata* seed additives.

Plantago lanceolata acts as a nephroprotective and a diuretic, activating the kidney to enhance urine output, which may explain the improvement in blood urea and creatinine levels (Elgazar and Aboraya, 2013)

Antioxidant components in *Plantago lanceolata* seeds protect cells and tissues, as shown in studies on its ability to lower blood levels of urea and creatinine and restore renal function (Kalender *et al.*, 2010; Hassan, 2016),(Hussein , 2012) .

There is evidence that the antioxidant effect of active compounds in *plantago lanceolata*, such as flavonoid and vit E, and their role in preventing and reducing production contribute to the provision of glucose as a direct energy source rather than proteins, which in turn lowers blood urea and creatinine concentrations (Sarer and Gokbulut, 2008 ; Adetoro *et al*., 2013).

5-8 Effect of *plantago lanceolata* seed powder on Vaccination Newcastle and Gomboro disease titer .

Because of their high concentrations of antioxidant chemical substances including phenolic compounds that function as cell protectors and boost the immune response, medicinal plants have been credited with improving the body's ability to fight against Newcastle disease (Azghadi *et al*., 2010) According to a team of researchers (Bozkurt *et al*., 2009),.

The findings disagreed with those of (Ramzi 2012), who demonstrated that addition treatments including *plantagolanceolata* seed had no discernible effect on the volumetric criteria for combating Gomboro disease (khaligh *et al*., 2011) (Rivera. *et al*., 2003) found that supplementing broiler meals with medicinal herbs helped boost the animals' immunity. Due to its superiority of addition coefficients to bay in the criterion directed at antibodies against Newcastle disease and to the role of medicinal plants in stimulating the increase in antibody production, the extract of prunsarmeniaca has an effect on the immunity of broilers (Kalia *et al*., 2017). This effect was observed in the reduction of broiler mortality and the improvement of broilers' immune status.

The immune system plays a crucial role in increasing both humoral and cellular immunity (Awaad *et al*., 2010) by secreting cytokines and protein molecules that control various kinds of immune cells and keep them within the body's favorable limitations.

In addition to age, sex, and genetics, the quantity and sources of protein have a direct influence on the immunological response of chicks because they affect the number of lymphocytes (T.lymphocyte) and, therefore, in the humeral immune response. "(Cheema, 2000)

Using the Ross 308 and Cobb broiler strains, Cheema *et al*. (2003) conducted a large number of tests investigating the effect of strain on the immune system. Specifically, the macrophage population increased in the Cobb strain, whereas the T. lymphocyte population increased significantly in the Rose strain 308. (cell mediated immune response).

5-9 Effect of *plantagolanceolata* seed powder on Fibresshia, spleen, and liver index

In agreement with BW, Alloui *et al*. 2005 found that increasing the bursa index had a positive effect and relationship, showing that the index's growth was efficient.

This study's findings corroborate those of Klasing (2002) and Ali (2006), who found that raising antibody titers against viruses caused an increase in the bursa index as a result of the immune system's proliferation and differentiation of cells.

When it comes to protect the broiler against disease, the bursa of Fabricius (BF) is an immune system like no other. The anatomical and physiological growth of BF was affected by environmental assaults such stress, poor cleanliness, vaccinations, and diseases (Alloui *et al*., 2005). For assessing immunity after vaccination, the BI estimate model is often used (Bolis *et al*.,2003). BF is a normal or healthy sized broiler. Chicks with diseases or that are stressed out have a lower body fat percentage than their healthy and productive counterparts. In 2006, Bennett and Stephens found.

5-10 Liver and intestinal Histological Features

Histological analysis of liver tissues from treated birds revealed congestion of central veins, hyperplasia of bile ducts, and inflammatory cell infiltration.

The avian liver, like the mammalian liver, is a biochemical factory where most synthesis, metabolism, excretion, and detoxification occurs. It helps with digestion and metabolism by controlling the synthesis, storage, and release of lipids, carbohydrates, and proteins (Denbow., 2000).

Blood proteins, enzymes, hormones, coagulation and immunological factors, and many more are all produced by the liver. It is a dual-purpose gland, producing both endocrine and exocrine hormones (Denbow., 2000).

Typical liver histology includes a central vein, normal, narrow sinusoidal capillaries, normal hepato cytes, lining endothelium of sinusoids, and kuppfer cells, and the presence of portal regions embedded within the parenchyma see figs. (4-1), (4-2), (4-3)and (4-4).

Liver results from groups T2 and T3, on the other hand, showed slight improvements in histological appearance, such as more regular hepatic capillaries, increased density of binucleated hepatocytes, more clearly visible endothelial cells lining sinusoids, and normal central vienin addition to more regulated epithelial lining of bile ducts, and kuppfer cells exhibiting normal shape and size.

This organ is essential to a bird's health and should be maintained in tip-top shape. Understanding the elements that might disturb the liver's metabolic processes and their significance in producing healthy birds requires further research.

The liver plays an important role in bile secretion, as well as lipid, glucose, and protein metabolism, among other metabolic processes. This structure responds well to many diets and environments. The liver plays a crucial role in digestion, metabolism, and other bodily processes, so learning more about it and the things that might impair its performance is important.

Additionally, the flavonoids included in *plantago lanceolata* serve as a significant antioxidant component, helping to lower oxidative stress and prevent the lipid peroxidation

process by scavenging (Ros 308) generation and increasing antioxidant levels (Jagadeesan and Kavitha, 2006; Amin *et al*.,2007). *Plantago lanceolata* contains glucosinolates and isothiocyanates, which have numerous biological properties including antioxidant effects, antibacterial and antifungal, and thus play an effective role in recovery the toxic effects of oxidative agents like liver damage and decrease serum liver enzymes levels (Hussein *et al*., 2010). Mashi, (2017) and AL-Qasoumi,(2010) indicated that *plantago lanceolata* was able to convert the

The contemporary chicken's digestive system has undergone significant alterations as a result of selective breeding for increased egg production in layers and faster development in broilers.

The absorption mechanism relies heavily on the villi. The epithelium consists of a single layer of columnar cells and a few layers of goblet cells. This sticky substance is produced by the mucus-secreting goblet cells. Regardless, feed supplements are used with healthy animals for nutritional purposes as well as for additional functionality on a permanent basis, in contrast to veterinary drugs, which are used only to medicate health problems under the supervision of a veterinarian and are applied for a limited period of time.Essential oils and *plantago lanceolata* promote healthy gut bacteria and increase feed consumption. Intestinal enzyme synthesis and secretion are also increased.

This might be because the advanced coating and spray - chilling technology delays stomach emptying, which in turn stabilizes the intestinal flora and leads to greater absorption of the digestible nutrients.

Histomorphological analysis revealed that the immune response to the Newcastle disease and Gumboro disease vaccine was shown in an increase in the number of mononuclear cells and lymphocytes as well as a lack of histological changes in the intestines and the liver (Ross et al., 2002).

Plantago lanceolata was included at both the 5% and 3% levels in the current investigation. When the number of goblet cells in the bird's small intestine rises, it may be because the bird is producing more mucin and other endogenous proteins. It has been

hypothesized (Silva and Smithard, 2002) that a greater thickness of the unstirred layer in the small intestine may reduce nutritional absorption.

According to research conducted on laboratory animals (Johnson *et al*. 1988), adding 5% herbal plant to meals significantly increases mucosal cell formation in both the large and small intestines, as well as the length of the crypts and the breadth of the villi at their bases.

Considering the diverse changes in GIT morphology, (Ertas *et al*.,2005) hypothesized that a component of the phytogenic activity of herbal plant seems to be irritation of gut tissues, leading to a decrease in intestinal surface area. Good effects on GIT health (such as a decrease in infection) may, on the other hand, induce larger villus length and gut surface area.

Chapter Six: Conclusions and Recommendations

6-1 Conclusions

According to the results

1- Addition of *plantago lanceolata* seeds improved broiler healthy such as (BW,BWG,FC ,FCR) when fed to the animals at a rate of 5gm /kg.

2- Addition of *plantago lanceolata* seed boost ND and IBD titer antibody the harmful effect on liver , intestine function and histological structure is reduced after treatment with *plantago lanceolata* seeds.

3- the nutritional condition growth performance of broiler chickens may be improved by using *plantago lanceolata* seed powder (3 gm., 5gm. /kg feed) in the diet.

4- adding *plantago lanceolata* seed powder (3 gm., 5 gm./kg feed) to the diets of vaccinated broilers may boost their antibody titers against Newcastle disease, as measured by the Elisa test.

6-2 Recommendations :

Present research supports the following recommendations:

1- Using *plantago lanceolata* seed powder as one of the feed additives (3 gm./ kg feed). That can be put to use boosting the efficiency of broiler production.

2- The effectiveness of *plantago lanceolata* seed powder in preventing microbial infection in broilers is the subject of a current research project.

3- Use of *plantago lanceolata* seed powder in layer feed .

4- research is suggested on the effects of *plantago lanceolata* seeds fed to pigeons, ostriches, and quail.

5-used *plantago lanceolata* as protective effect against microbial infection .

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Appendices

Appandix (1)

Concentration of serum total protein g/L

Total serum protein concentration was measured by using kit produced by BIOLABO SAS company , Les Hautes Rives, Maizy/ France, according Biuret method as colorimetric reagent to estimate the total protein which depend on the interaction of copper iron with protein of the sample in alkaline medium forming a colored complex that could be measured by spectrophotometer. The test was conducted according to the steps that were referred by the production company (TIETZ ,2000) .

1. **Kit contents:**

REAGENTS:

R1 TOTAL PROTEIN	**Reagent**
Sodium hydroxide	370 mmol/L
Na-K Tartrate	10 mmo/L
Potassium iodide	3 mmol/L
Copper II sulfate	3 mmol/L

1. **Manual procedure:** Total protein concentration in serum samples was measured according to the following:

a. Reagent and serum samples were brought to room temperature.
b. Serum sample, blank and standard were treated as follows:

procedure for determination of total serum protein concentration g/L

The Detailed Kenza 240TX procedure is available on request

Wavelength: 550 nm

Temperature: 37°C

- Let stand reagent and specimens at room temperature.

procedure for determination of total serum protein concentration g/L

	Automated analyzer	**Manual procedure**
Reagent	250 Ml	1000 µL
Standard,Controls,Specimen	5 µL	20 µL
Mix well. Let stand for 10 minutes. **Record absorbance at 550 NM (530-570) against reagent blank.**		

2. **Calculations:** Results were calculated according to the following equation:
   Protein concentration in the sample (g/L) = (absorbance of the sample / absorbance of standard) x concentration of standard.

Appendix (2)

Measurement of AST \ ALT

The determination of AST TGO-ALT TGP was made by using kit test provided by the BIOLABO SAS compan , Les Hautes Rives, Maizy/ France.

- **Procedure for determination of AST TGO-ALT TGP mg/dl**
- **REAGENTS**

Vial R1 **TGO SUBSTRATE**

Phosphate Buffer ph 7.5 85 mmol/L 2-oxogltarate 2 mmol/L
L-aspartate 200 mmol/L Preservative

Vial R2 **TGP SUBSTRATE**

Phosphate Buffer PH 7.5 100 mmol/L 2-oxogltarate 2 mmol/L
L-alanine 200 mmol/L Preservative

Vial R3 **COLORATION REAGENT**

2.4- dinitrophenyl-hydrazine (DNPH) 1 mmol/L
HCL 1 mmol/L

Vial R3

STANDARD SOULUTION

Sodium Pyruvate	2	mmol/L
Sodium Mercurothiolate	0.1	%
Phosphate Buffer pH 7.5	100	mmol/L

- Let stand reagents and specimens at room temperature.

Procedure for determination of AST TGO-ALT TGP mg/dl

Pipette into test tubes	**TGO**	**TGP**
Reagent R1	1 mL	
Reagent R2		1 mL
Incubate for 5 minutes at 37°C. Add :		
Serum	200 µL	200 µL
Mix and incubate at 37°C during :	Exactly 1 hour	Exactly 30 minutes
Reagent R3	1 mL	1 mL
Mix and let stand 20 minutes at room temperature. Add:		
NaOH 0.4 N	10 mL	10 mL
Mix. Let stand 5 minutes and read absorbances at 505 nm against water.		

CALCULATION

Calculate the result as follows:

- ✓ Refer to enclosed Standard Curves (batch specific) **or**
- ✓ Plot Standard Curves on millimeter paper (Absorbances) or semi- log (% of transmission) handling as indicated on board 1.

Abscissa : number of units (IU/L)

Ordinat : Absorbances (or % of transmission)

Transfer “Assay” absorbances or % of transmission of Standard Curve and calculate TGO or TGP activity in IU/L.

Appendix (3)

Concentration of serum albumin g/L

Albumin concentration was measured by using Kit produced by BIOLABO SAS company, Les Hautes Rives, Maizy/ France, according to (BCG) method (Bromocresol green method) as colorimetric method which based on the specific binding of bromocresol green, an anionic dye and the protein (Albumin) at acid pH with the resulting shift in the absorption wavelength of the complex violet (Coulevea complex). The intensity of the color formed is proportional to the concentration of albumin in the sample (TIETZ ,2006)

BCG+ Albumin ⟶ BCG- Albumin Complex (complexviolet)

1. **Kit contents:**

2. **REAGENT COMPOSITION**

Vial R 1 **BROMOCRESOL GREEN**

Succinic acid 83 mmol/L

Bromocresol green (BCG) 167 µmol/L

Sodium hydroxide 50 mmol/L

Polyoxyethylene monolauryl ether 1.00 g/L

Preservative

Vial R2 **STANDARD**

Bovine albumin 5.0 g/dL (725 µmol/L)

3. **Manual procedure:** Albumin concentration in serum samples was measured according to the following:

a. Reagent and serum samples were brought to room temperature.

b. Serum sample, blank and standard was treated as follows:

Concentration of serum albumin g/L

Pipette into well identified test tubes:	**Blank**	**Standard**	**Assay**
Reagent	2.5 mL	2.5 Ml	**2.5 mL**
Demineralised water	5 µL		
Specimen			**5 µL**
Standard		5 µL	
Mix well. Record absorbance at 630 nm (620-640) within 3 minutes against reagent blank or better after exactly 1 minute (note 2).			

4-Calculations: Results were calculated according to the following equation:

Albumin concentration in the sample (g/L) = (absorbance of the sample/absorbance of standard) x concentration of standard.

Appandix (4)

Quantitative determination of cholesterol:

Principle of the method

The cholesterol present in the sample originates a coloured complex, according to the following reactions:

$$\text{Cholesterol esters} + H_2O \xrightarrow{\text{CHE}} \text{Cholesterol} + \text{fatty acids}$$

$$\text{Cholesterol} + O_2 \xrightarrow{\text{CHOD}} \text{4-Cholestenona} + H_2O_2$$

$$2\,H_2O_2 + \text{Phenol} + \text{4-AP} \xrightarrow{\text{POD}} \text{Quinonimine} + 4H_2O$$

The intensity of the color formed is proportional to the cholesterol concentration in the sample.

REAGENTS:

R	Pipes pH 6.9	90 mmol\L
	Phenol	26 mmol\L
	Cholesterol esterase (CHE)	1000 U\L
	Cholesterol oxidase (CHOD)	300 U\L
	Peroxidase (POD)	650 U\L
	4-Aminophenazone (4-AP)	0.4 mmol \L
Optional	SPINTROL H CAL	

STORAGE AND STABILITY:

All the components of the kit are stable until the expiration date on the label when stored tightly closed at 2-8ºC, protected from light and contaminations prevented during their use.

Do not use reagents over the expiration date.

Signs of reagent deterioration:

- Presence of particles and turbidity.

- Blank absorbance (A) at 505 nm 0.26.

ADDITIONAL EQUIPMENT:

- Spectrophotometer or colorimeter measuring at 505 nm.

- Matched cuvettes 1.0 cm light path.

- General laboratory equipment.

SAMPLES:

Serum or plasma1,2: Stability of the sample 7 days at 2-8ºC or freezing at –20ºC will keep samples stable for 3 months.

REFERENCE VALUES:

Risk evaluation5,6: Less than 200 mg/Dl	Normal

200-239 mg/Dl	Borderline
240 mg/dL and above	**High**

These values are for orientation purpose; each laboratory

should establish its own reference range.

QUALITY CONTROL:

Control sera are recommended to monitor the performance of assay procedures: SPINTROL H Normal and Pathologic (Ref. 1002120 and 1002210). If control values are found outside the defined range, check the instrument, reagent and calibration for problems. Each laboratory should establish its own Quality Control scheme and corrective actions if controls do not meet the acceptable tolerances.

Appandix (5)

Quantitative determination of triglycerides mg/dl:

PRINCIPLE OF THE METHOD

Sample triglycerides incubated with lipoproteinlipase (LPL), liberate glycerol and free fatty acids. Glycerol is converted to glycerol-3-phosphate (G3P) and adenosine-5-diphosphate (ADP) by glycerol kinase and ATP. Glycerol- 3-phosphate (G3P) is then converted by glycerol phosphate dehydrogenase (GPO) to dihydroxyacetone phosphate (DAP) and hydrogen peroxide (H_2O_2).

In the last reaction, hydrogen peroxide (H_2O_2) reacts with 4- aminophenazone (4-AP) and p-chlorophenol in presence of peroxidase (POD) to give a red colored dye:

$$\text{Triglycerides} + H_2O \xrightarrow{\text{LPL}} \text{Glycerol} + \text{free fatty acids}$$

$$\text{Glycerol} + \text{ATP} \xrightarrow{\text{Kinase glycerol}} \text{G3P} + \text{ADP}$$

$$\text{G3P} + O_2 \xrightarrow{\text{GPO}} \text{DAP} + H_2O_2$$

$$H_2O_2 + \text{4-AP} + \text{p-Chlorophenol} \xrightarrow{\text{POD}} \text{Quinone} + H_2O$$

The intensity of the color formed is proportional to the triglycerides concentration in the sample.

REAGENTS:

R	Good pH6.3	50 mmol\L
	p-Chlorophenol	2 mmol\L
	Lipoprotein lipase (LPL)	150000 U\L
	Glycerol kinase (GK)	500 U\L
	Glycerol -3-oxidasa (GPO)	3500 U\L
	Peroxidase (POD)	440 U\L
	4-Aminophenazone (4-AP)	0.1 mmol\L
	ATP	0.1mmol\L

STORAGE AND STABILITY:

All the components of the kit are stable until the expiration date on the label when stored tightly closed at 2-8ºC, protected from light and contaminations prevented during their use. Do not use reagents over the expiration date.

Signs of reagent deterioration:

- Presence of particles and turbidity.

- Blank absorbance (A) at 505 nm > 0.40.

ADDITIONAL EQUIPMENT

- SPIN 800 Autoanalyzer.

- General laboratory equipment.

SAMPLES

Serum or plasma1.

Stability of the sample: Triglycerides are stable for 5 days at 2-8ºC.

QUALITY CONTROL

Control sera and calibrators are recommended to monitor the performance

of assay procedures: SPINTROL H Calibrator, SPINTROL H Normal and

Pathologic (Ref. 1002011, 1002120 and 1002210).

If control values are found outside the defined range, check the instrument,

reagents and technique for problems.

Each laboratory should establish its own Quality Control scheme and corrective actions if controls do not meet the acceptable tolerances.

REFERENCE VALUES

Men 40 – 160 mg/dL

Women 35 – 135 mg/dL

These values are for orientation purpose; each laboratory should establish its own reference range.

PERFORMANCE CHARACTERISTICS

Measuring range: From detection limit 0,000 mg/dL to linearity limit 1600 mg/dL. If the concentration is greater than linearity limit dilute 1/2 the sample with ClNa 9 g/L and multiply the result by 2.

Precision:

Intra-assay (n=20)			**Inter-assay (n=20)**	
Mean (mg/dL)	**109**	**224**	**111**	**224**
SD	**0.64**	**1.01**	**3.74**	**7.90**
CV(%)	**0.58**	**0.45**	**3.38**	**3.52**

Sensitivity: 1 mg/dL = 0,0013 (A).

Accuracy: Results obtained using SPINREACT reagents (y) did not show

systematic differences when compared with other commercial reagent (x).

The results obtained using 50 samples were the following:

Correlation coefficient (r)2: 0,99810.

Regression equation: y= 0,9178x - 0,5426

The results of the performance characteristics depend on the analyzer used.

Appandix (6)

Estimation of serum HDL cholesterol concentration mg/dl:

Principle of the method

The very low density (VLDL) and low density (LDL) lipoproteins from serum or plasma are precipitated by phosphotungstate in the presence of magnesium ions. After centrifugation the supernatant contains high density lipoproteins (HDL). The HDL cholesterol fraction is determined using the total cholesterol enzymatic reagent**.**

REAGENTS

R Precipitating Reagent	**Phosphotungstic acid** **Magnesium chloride**	**14 mmol/L** **2 mmol/L**
Optional STD **Optional reagent**	**HDL Aq. Prim. Std** **Cholesterol CHOD-POD**	**50 mg/dL**

STORAGE AND STABILITY

All the components of the kit are stable until the expiration date on the label when stored tightly closed at 2-8ºC, protected from light and contaminations prevented during their use. Do not use reagents over the expiration date.

Signs of reagent deterioration:

- Presence of particles and turbidity.

ADDITIONAL EQUIPMENT

- Spectrophotometer or colorimeter measuring at 505 nm (500-550).

- Matched cuvettes 1,0 cm light path.

- General laboratory equipment.

SAMPLES

Serum or plasma1: Free of hemolysis. Removed from the blood clot as soon as possible.

Stability: HDL Cholesterol is stable for 7 days at 2-8ºC.

PROCEDURE

Precipitation (Note 1)

1. Pipette into a centrifuge tube:

2. Mix well; allow to stand for 10 min at room temperature.

3. Centrifuge at 4000 r.p.m. for 20 min or 2 min at 12000 r.p.m.

4. Collect the supernatant and proceed it as a sample in the total cholesterol determination.

R (µL) 100

Sample (mL) 1,0

Calculation:

Calculated LDL-cholesterol (Friedewald)

LDLc = Total cholesterol - HDLc - (TG/5)

Appandix (7)

Estimation of serum LDL-cholesterol concentration mg/dl:

PRINCIPLE OF THE METHOD

Direct determination of serum LDLc (low-density lipoprotein cholesterol)

levels without the need for any pre-treatment or centrifugation steps.

The assay takes place in two steps.

Elimination of lipoprotein no-LDL

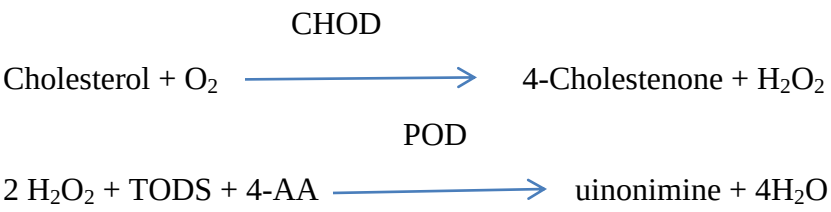
$$\text{Cholesterol esters} \xrightarrow{\text{CHO}} \text{Cholesterol + Fatty acids}$$

$$\text{Cholesterol + O} \xrightarrow{\text{CHOD}} \text{4-Cholestenone + } H_2O_2$$

$$2\ H_2O_2 \xrightarrow{\text{catalase}} 2H_2O + O_2$$

Measurement of LDLc

$$\text{Cholesterol esters} \xrightarrow{\text{CHE}} \text{Cholesterol + Fatty acids}$$



REAGENTS:

The intensity of the color formed is proportional to the LDLc concentration in the sample

SAMPLES

Serum, heparinized plasma or EDTA plasma. If any sample show

precipitates, centrifuge before using5.

Serum stable 6 days at 2-8ºC. Do not freeze the samples

R 1 Enzymes	PIPES Buffer pH 7.0	50 mmol/L
	Cholesterol esterase (CHE)	≥600 U/L
	Cholesterol oxidase (CHOD)	≥500 U/L
	Catalase	≥600 U/ml
	TOOS	2 mmol/L
R 2 Enzymes	PIPES Buffer pH 7.0	50 mmol/L
	4 – Aminoantipyrine (4-AA)	4 mmol/L
	Peroxidase (POD)	≥4 KU/L

REFERENCE VALUES 6,7,8

Optimal < 100 mg/dL

Near or above optimal 100-129 mg/dL

Borderline high 130-160 mg/dL

High > 160 mg/dL

These values are for orientation purpose; each laboratory should establish its own

reference range.

PERFORMANCE CHARACTERISTICS

Measuring range: From detection limit of 17 mg/dL to linearity limit of 976 mg/dL. If the results obtained were greater than linearity limit, dilute the sample 1/2 with NaCl 9 g/L and multiply the result by 2.

Precision:

Intraserie (n= 20)			**Interserie (n= 20)**	
Media (mg/dL)	**132.5**	**204.0**	**129.8**	**198.2**
SD	**3.28**	**2.20**	**4.29**	**7.19**
CV(%)	**2.48**	**1.09**	**3.31**	**3.62**

Sensibility: 1 mg/dL = 0.001694 (A).

Accuracy10.14: Results obtained using SPINREACT reagents (y) did not show systematic differences when compared with other commercial reagents (x).

The results obtained using 54 samples were the following:

Correlation coefficient (r)2: 0.99**.**

Regression equation: y= 0.9634x + 5.35.

The results of the performance characteristics depend on the analyzer used.

Appandix (8)

Creatinine estimation mg/dl:

principle

Creatinine reacts with picric acid under alkaline condition to form a yellow-red complex. The absorbance of the color produced, measured at a wavelength 492 nm, is directly proportional to creatinine concentration in the sample.

Alkaline pH

Creatinine + picrate ⟶ yellow-red complex

Reagent:

Standard (ST)

2 mg/dL 177 mmol/L

Reagent 1 (R1)

Picric acid 25 mmol/L

Surfactants

Creatinine Picric Acid Reagent contains a low concentration of picric acid, a chemical which, in its dry form, is flammable and potentially explosive. For this reason, it is recommended that drains be well flushed with water when disposing the reagent, spills be cleaned up at once, and avoid dryness of the material around the reagent bottle opening.

Reagent 2 (R2)

Sodium hydroxide 0.4 mol/L

Irritant (xi) R36/38: Irritating to eyes and skin. **S26:** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. **S37/39:** Wear suitable gloves and eye/face protection.

Reagent Preparation

Prepare working solution as following:

Combine one volume of R1 with one volume of R2 e.g.

1.0 ml R1 + 1.0 ml R2.

Reagent Storage and Stability

All reagents are stable until expiration date stated on label when stored at 15 - 25 oC. Working solution is stable for one day at 15 – 25 oC away from light.

Procedure

Pipette into test tubes

Mix, and after 30 seconds. read the absorbance A1 of the standard or specimen. After exactly 2 minutes later, read absorbance A2 of standard or specimen.

Working solution	0.1 ml
Standard or specimen	100 ml

Calculation:

A2 – A1 = Aspecimen or Astandard.

Concentration of creatinine in serum:

Creatinine (mg/dL) = A specimen / A standard x 2

Concentration of creatinine in urine:

Creatinine (mg/dL) = A specimen / A standard x 2 x 50

Appandix (9)

Blood Urea estimation mg/dl:

Assay Principle

The series of reactions involved in the assay are as follows :

1. Urea is hydrolyzed in the presence of water and urease to produce ammonia and carbon dioxide :

$$\text{Urea} + H_2O \xrightarrow{\text{Urease}} 2NH_3 + CO_2$$

2. In the presence of glutamate dehydrogenase (GLDH) and reduced nicotinamide adenine dinucleotide (NADH) , the ammonia combines with (α – KG) to produce L-glutamate .

$$2NH_4 + 2\alpha - KG \xrightarrow{GLDH} 2L\text{-Glutamate}$$

\+ +

2NADH 2NAD+ + H2O

The rate decrease in the NADH concentration is directly proportional to the urea concentration in the specimen. It is determined by measuring the absorbance at 340nm.

Reagents

Standard urea (ST)

50 mg/dl 8.33 mmol/L

Reagent

Tris Buffer (pH8.5)	50 mmol/L
A-Ketoglutarate	10 mmol/L
GLDH	8.0 K U/L
Urease	5.0 K U/L
Sodium azide	8.0 mmol/L
NADH	>0.20 mmol/L
Sodium azide	8 mmol/L

The reagent also contains additives required to maintain NADH in its reduced form.

System Parameters Wavelength 340 nm

Optical path 1 cm

Assay type	Fixed Rate
Direction	Decrease
Sample : Reagent Ratio	1 : 100
e.g.: Reagent volume	1 ml
Sample volume	10 µl
First read time	30 seconds
Delay time	60 seconds
Last read time	90 seconds
Temperature	37 ºC
Zero adjustment	Against Air
Reagent Blank Limits	Low 0.9 AU
	High 2.0 AU
Sensitivity	0.9 mg/dL (0.15 mmol/L)
Linearity	300 mg/dl (49.8 mmol/L)

Procedure

	Standard	Specimen
Reagent ®	1 ml	1 ml
Standard	10 µl	------
Specimen	------	10 µl

Mix, and after 30 seconds read the absorbance A1 of the standard or specimen. Exactly 1 minute later, read the asorbance A2 of standard or specimen.

Calculation :

Δ A specimen = A1 specimen – A2 specimen

Δ A Standard = A1 Standard – A2 Standard

$$\text{Serum blood urea concentration (mg/dl)} = \frac{\Delta A_{\text{specimen}}}{\Delta A \text{ Standard}} \times n$$

Where n = 50.0 mg/dL (8.33mmol/L)

Urine blood urea concentration is determined by multiplying the result by the dilution factor (50).

Appandix (10)

Antibody Titer Newcastle and Comboro Diseases

ELISA Test :

The ELISA technique was applied according to the method described by Synbiotic Laboratories Incorporation, USA. The antigen coated plates and ELISA kit reagents were adjusted at room temperature prior to the test. After then, the plate was read using an ELISA plate reader at wave length 405 nm , the data was registered whereas optical density values were directed proportion with antibody titers and reaction intensity proportion with antibodies value which present in antiserum was observed in color change of plate wells .(Ames, Iowa: Iowa State Press, Blackwell Publishing, 2008)

EQUIPMENT AND MATERIALS REQUIRED, BUT NOT PROVIDED

a) High precision multiple delivery pipetting devices (i.e., 1-20 and 20-200 µL. The Measurement deviation must be ≤10 % for volumes ≤10 µL and ≤ 5 % for all other volumes).

b) 8- or 12-channel pipettes (i.e., 5-50 and 50-300 µL) and pipette tips.

c) 0.2 ml, 1.0 ml, and 5.0 ml pipettes.

d) 2 graduated cylinders (50 ml).

e) 1 ml or 5 ml glass test tubes.

f) Uncoated low binding 96 well Microplates with > 300 µL/well volume.

g) Deionized or reverse osmosis water.

h) Microplate reader with 405-410 nm filter.

i) Microplate washing apparatus.

REAGENTS REQUIRED TO PERFORM 90 TESTS

a) 1 NDV antigen coated microplate.

b) 10 µL 100X Positive Control.

c) 10 µL 100X Normal Control.

d) 120 µL 100X Conjugate.

e) 46 ml Dilution Buffer.

f) 20 mL 20X Wash.

g) 10 mL Substrate.

h) 2.5 mL 5X Stop.

Sample Collection

For routine serologic flock monitoring:

- Randomly collect a statistically significant number of samples at routine intervals (for example, collect 30 sera every 21 days).
- Follow proper sample collection procedures.
- Harvest serum and store properly (up to seven days at 4 °C, -20 °C for longer).

- Test only good quality serum (i.e., avoid bacterial contamination, heavy hemolysis or lipemia). When in doubt, obtain a better quality sample

Method

1- Kit and consist 2 part specific and general.
2- Dilution the serum with dilution 1:50 ml.
3- Used plate diluted to dilution the serum.
4- Prepared plate of Elisa.
5- Diluted the control material Dilution Buffer 5:250 ml.
6- Used 2 type of control (negative and positive).
7- Added 50 ml from the Dilution Buffer.
8- Put the Elisa plate 5 min at room temperature.
9- Washed the plate 3 times by Dilution Buffer.
10- Delusion wash diluted by the Distilled water 1:19.
11- Used cylinder to prepare the Dilution Buffer.
12- Added Conjugate reaction consists (enzyme & antibody).
13- Diluted the Conjugate by Dilution Buffer 1:100.
14- The reaction (Ab+Ab+Ag).
15- Put the plate 30 min in the incubator 21 ℃.
16- Washed the plate by Dilution Buffer 3 times.
17- Used substrate diluted with Dilution Buffer (1:5).
18- Substrate + conjected enzyme → green color of the reaction.
19- Put stop reaction the stop reaction.
20- Used the Elisa plate reader at wave length 405nm , the data were registered whereas optical density values were directed proportion with antibody titers and reaction intensity proportion with antibodies value which present in antiserum was observed in color change of plate wells.
21- Read the reaction through 20 min, after that happens the degradation reaction.

الخلاصة:

اجريت هذه الدراسة لمعرفة تأثير اضافة مسحوق بذور لسان الحمل في الاداء الانتاجي ،الصفات الدمية والاستجابة المناعية لفروج اللحم.

تم استخدام (200) افراخ لحم من نوع (روز 308) بعمر يوم واحد في التجربة . اجريت هذه التجربة في حقل الدواجن بمدينة المسيب لمدة 35 يوم من 2021/12/24 ولغاية 2022/1/28 وزعت الافراخ بصورة عشوائية على اربع معاملات تجريبية وبواقع 50 كتكوت لكل معاملة (مكررين لكل معاملة) والتي شملت 25 كتكوت مكرر على النحو التالي:

المجموعة الاولى (T1) تم تغذية الافراخ على عليقة اساسية دون اي اضافة (معاملة السيطرة) ، المجموعة الثانية (T2) تم تغذية الافراخ على عليقة اساسية يحتوي على مسحوق بذور لسان الحمل (1غم / كغم علف) ، المجموعة الثالثة (T3) تم تغذية الافراخ على عليقة اساسية يحتوي على مسحوق بذور لسان الحمل (3 غم / كغم علف) اما المجموعة الرابعة (T4) تم تغذية الافراخ على عليقة اساسية تحتوي على مسحوق بذور لسان الحمل (5 غم / كغم علف.

تم قياس الاداء الانتاجي اسبوعيا اما المعايير الاخرى فقد تم قياسها في اليوم 35 من التجربة.

اظهرت النتائج وجود فروق معنوية في معدل الوزن الاسبوعي والزيادة الوزنية في افراخ التسمين المضاف اليها مسحوق بذور لسان الحمل بالتراكيز (1غم ، 3 غم ، 5 غم / كغم علف) على التوالي مقارنة مع مجموعة السيطرة ، تناقص استهلاك العلف معنويا في الطيور المغذاة على مسحوق بذور لسان الحمل مقارنة مع السيطرة واظهرت جميع المجموعات المعالجة انخفاضا معنويا في نسبة تحويل العلف مقارنة مع مجموعة السيطرة . نشاط انزيمات الكبد اظهر قيمة اقل بكثير في المجاميع المضافة مقارنة بمجموعة السيطرة.

اظهرت نتائج معيار الاجسام المضادة ضد مرض النيوكاسل والكمبورو في المعاملة الثانية قيمة اعلى بكثير من المجموعات الاخرى ، كما اظهر الوزن النسبي للكبد والبورصة عدم وجود فروق معنوية بين جميع المعاملات.

جامعة كربلاء

كلية الطب البيطري

تأثير اضافة مسحوق نبات لسان الحمل على بعض الصفات الانتاجية ، الفسيولوجية و الاستجابة المناعية للدجاج اللاحم

رسالة مقدمة الى مجلس كلية الطب البيطري /جامعة كربلاء وهي جزء من متطلبات نيل درجة الماجستير في اختصاص الصحة العامة البيطرية

من قبل

شيماء علاوي

بإشراف

ا.م.د. كاظم صالح كاظم

ميلادي 2022 **1444 هجري**