Effect of Supplementation of Anise (*Pimpinella ansium*) to Raw Cowpea (*Vigna unguiculata*) as Feed Additive on Broiler's Chicks Performane

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DEDICATION

This work is dedicated

To my dear Mother and father

To my brothers and sister

Especial dedication to my brother Mohammed

and

To my friends and colleagues

With love and respect

Tagwa

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Praise be to Allah the lord of the world strength to perform this work upon his goodness done and bless.

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Tagwa

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ABSTRACT

Addition of Anise (pimpinella ansium) in Raw Cowpea (*Vigna unguiculata*) Broiler Diets

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An experiment was conducted to study the effect of supplementation of Anise as feed additive on broiler chicks performance.

A total of one hundred and twenty eight unsexed one day old broiler chicks (hubbered) were used. The birds were randomly divided into four equal groups, of 32 birds with four replicates (8birds/replicate) in completely randomize design, four isocaloric and isonitrogenous diets A, B, C and D were formulated to meet the nutrient requirement for broiler chicks. Diet A contains a conventional feed ingredient as control, diet B contains (20% raw cowpea + 0.25% anise), diet C contains (20% raw cowpea + 0.50% anise) and diet D contains (20% raw cowpea + 0.75 anise). Parameters measured were weekly feed intake, body weight and feed conversion ratio(FCR). At the end of experimental period (6 weeks), birds were randomly selected (5 birds/replicate), weighed and slaughtered. The carcass weight were obtained and dressing percentage were calculated.

The result showed that inclusion of Anise had no effect on feed intake up to the fifth week, whereas in the sixth week Anise significantly ($P<0.05$) increased feed intake, moreover, the treatments had significant ($P<0.05$) effect on total feed intake, the highest value observed in birds fed Anise at 0.75%. The dietary treatment had significant effect ($P<0.05$) on weekly weight gain up to the fourth week, weekly (FCR) showed significant difference during first and second week, whereas there was no significant effect on the final weight, total weight gain, total FCR and dressing percentage, carcass weight increased significantly by anise supplementation.

In conclusion, the best performances and return value was observed in those birds fed (0.75%), Anise can be use as natural feed additive in broiler chicks diet.

المستخلص

إضافة اليانسون إلي اللوبيا الحلو الخام
في غذاء الدجاج اللاحم

تقوي عبد الوهاب محمد قسم الله
ماجستير العلوم في علوم التغذية

أجريت هذه الدراسة لمعرفة تأثير إضافة اليانسون كمضاف علف طبيعي علي أداء الدجاج اللاحم. استخدمت في التجربة 128 كتكوت لاحم غير مجنس عمر يوم من سلالة هبيرد . وزعت الطيور عشوائياً إلي أربع معاملات متساوية بكل منها 32 طائر، قسمت ألي أربع تكرارات (8طيور/مكرر) باستخدام التصميم كامل العشوائية. كونت أربع علائق متساوية البروتين والطاقة حسب الاحتياجات الغذائية للدجاج اللاحم. العليقة الشاهد (أ) تحتوي علي المكونات الغذائية الاساسية ، العليقة (ب) تحتوي علي 20% لوبيا حلو خام و 0.25% يانسون، العليقة (ج) تحتوي علي 20% لوبيا حلو خام و 0.50% يانسون والعليقة (د)تحتوي علي 20% اللوبيا حلو خام و 0.75% يانسون.

جمعت بيانات عن الغذاء المستهلك والوزن الحي ومعدل التحويل الغذائي أسبوعياً. وفي نهاية التجربة (6 أسابيع) أخذت الطيور عشوائياً (5 طيور/مكرر)، وزنت ثم ذبحت و تم اخذ أوزن الذبيح ثم حساب نسبة التصافي.

أظهرت النتائج المتحصل عليها من إضافة اليانسون ليس له تأثير معنوي علي المستهلك من العلف حتى الأسبوع الخامس بينما في الأسبوع السادس كانت هنالك زيادة معنوية ($P<0.05$)، كما توجد فروق معنوية ($P<0.05$) للعلف المستهلك الكلي اعلي قيمة لوحظت في الطيور المغذاء بنسبة 0.75% يانسون . هناك تأثير معنوي للمعاملات الأسبوعية للوزن الحي حتى الأسبوع الرابع من العمر، معدل التحويل الغذائي الاسبوعي اظهر فروق معنوية خلال الاسبوعين الاول والثاني، لم تظهر المعاملات فروق معنوية بالنسبة الوزن النهائي ، لمعدل التحويل الغذاء الكلي ونسبة التصافي ،وزن الزبيح زاد معنويا بمضاف اليانسون .

لوحظ أفضل أداء وعائد اقتصادي عندما غذيت الطيور علي 0.75% يانسون يمكن إدخال اليانسون كمضاف علفي طبيعي للدجاج اللاحم.

CHAPTER ONE

INTRODACTION

Food additives are materials that are administered to the animal to enhance the effectiveness of nutrients and exert their effects in the gut or on the gut wall cells. (Mcdonal, *et al*, 2002). Recently there has been a renewed interest in improving health and fitness through the use of more natural products. DeSouza, (2005) mentioned that herbs and spices are an important part of the human diet. They have been used for thousands of years to enhance the flavor, color and aroma of food. Herbs and spices are also known for their preservative and medicinal value. Yet it is only in recent years that modern science has started to pay attention to the properties of spices.

Essential oils in aromatic plants are used extensively in medicine and in the food and cosmetic industries, in addition to increase production of digestive enzyme and improve utilization of digestive product through enhanced liver function, also improved digestion of protein, cellulose and fat. (Hernandez *et al* 2004 and Jamroz and Kamel, 2002).

In limited research, some aromatic plants and their components on the performance, the addition of these substances to the feeds and water improved feed intake, feed conversion ratio and carcass yield (Alçiçek *et al.,* 2003).

Moreover Anise considered as natural growth promoter, obtain high gain with feeding 400 mg/kg anise oil to broiler, (Ciftci*, et al* 2005).

More recently it found that 4% Anise supplemented into laying quail resulted in improvement of production and enhanced immune response. (Bayram, *et al* 2007).

Anise is used an appetizer tranquillizer and diuretic drugs antioxidant. (Tyler et al , 1988; and Lawless, 1999). It was found the Anise oil has antimicrobial activity, antibacterial and antifungal. (Shukal & Tripathi 1987, Kubo, 1993, Newall *et al*, 1996, Ganyrade *et al*, 1990).

Cowpeas are an important source of food worldwide and have occupied an important place in the diets of people in many African countries as excellent and inexpensive source of protein, fatty acids, essential amino acid, vitamins and minerals (Fageria *et al* 1990). Therefore the objective of the current study was to assess the effect of addition of *pimpinella animus* into high cowpea seed basal diet on the feed intake, weight gain, feed conversion ratio and of broiler chicks.

CHAPTER TWO

LITERTURE REVIEW

2.1 Feed additive

Feed additives of plant origin such as essential oils or extracts of aromatic plants that would satisfy consumer perceptions and would be closer to environmentally friendly farming practices, have received considerable attention as alternatives to traditional antibiotic growth promotants. Several studies have been conducted on the effect of dietary essential oils or combinations on the performance of poultry but with varying and often conflicting results. While some reports suggested that dietary herbal essential oils improved growth performance (Alcicek *et al*., 2003; Basmacioglou *et al*., 2004), others showed no such effect (Botsoglou *et al*., 2002a; Lee *et al*., 2003; Papageorgiou *et al*., 2003).

The trend for a more natural nutrition has raised the interest in natural plant based ingredients for both human and animal nutrition. Herbal feed additives comprise a wide variety of herbs, spices and essential oils. Apart from enhancing the taste of food and its flavor, such feed additives are believed to exert positive effects on digestion and intestinal health. Important effects associated with herbal additives are the prevention of digestive disturbance, an improved feed utilization and animal performance. The EU decision to ban the use of antibiotic feed additives accelerated probiotic application in animal nutrition. Nevertheless, a sound scientific basis for the evaluation of conditions under which probiotics might be beneficial is largely missing.(Awad ,2009).

Feed additives are used more desirable consumer products, however, poultry product (broiler meat or yolk) additive are used to improve pigmentation. The green grasses contain in addition to the green pigment chlorophyll an umber of red and yellow pigments known as xanthophylls,

which normally is deposited in the fat and skin of broilers and the yolk of egg, Middendarf *et al* (1980) developed a method used to assess the biological availability of xanthophylls.

Improvement of feed ingestion can be done by using additive as pellet binders for example (scott, 1982).reported that lignin has no nutritive value for chicken, is only added to improve the firmness of the pellets. Also ingestion can improved by adding flavoring agents, since the chickens were proved to possess a taste sense (kare, 1965).

Some additive are used to alter metabolism of the chicken for example number of compounds and drugs used to bring a rapid molt or a pause after long period of egg production as in zinc oxide, however supplementation of the diet with zinc as zno or zinc acetate lead to decline of feed intake and cessation of egg production (shippee *et al*, 1979). Another type of additive which aid feed digestion lilies enzymes.

potter *et al* (1965), wrote that addition of antifungal enzyme lead to increase in the metabolizable energy content of barely. Additives also used as antifungal to prevent growth storage molds. Garlich *et al* (1976) mentioned addition of propoinc acid and sodium propionate prevent growth storage in feed ingredients.

2.2 Common names of Anise

Synonyms Aniseed, Anis seed, Anis, Anise, Sweet cumin Parts used are Seeds (fruits) and oil. Pimpinella anisum (L.) (Umbelliferae-Apiaceae) (anise, aniseed) was first cultivated as a spice by the ancient Egyptians and later by the Greeks, Romans and Arabs.

Although widely grown commercially its cultivation has declined in recent years through competition with cheaper anise flavorings, such as illicium verum and synthetic anethole. It is a sweet, warming, and stimulant

herb that improves digestion, benefits the liver and circulation, and has expectorant and estrogenic effects (Ates and Erdogrul,2003).

As an aromatic plant, anise (*Pimpinella anisum L*.) is an annual herb indigenous to Iran, India, Turkey and many other warm regions in the world. Anise oil contains *anothole* (85 %) as an active ingredient, in addition to *eugenol, methylchavicol, anisaldehyde* and *estragole* (Bayram *et al*, 2007).

Anise (*Pimpinella anisum* L., *Apiaceae*) is an annual herb indigenous to Near East and widely cultivated in the Mediterranean rim (Turkey, Egypt, Syria, Spain, *etc*.) and in Mexico and Chile. It has been used as an aromatic herb and spice since Egyptian times and antiquity and has been cultivated throughout Europe (Hansel *et al,* 1999).

2.3 Cultivations

Anise is cultivated in Turkey, Egypt, Spain, Russia, Italy, India, Greece, Northern Africa, Argentina, Malta, Romania and Syria. The quality differences between anise seed from different origins are not significant and therefore specifications need not limit the spice to a specific country of origin. (Tainter and Grenis, 1993; and Wagner, 1999) *P. anisum* requires a warm and long frost-free growing season of 120 days.

The plant needs a hot summer to thrive and for seeds to ripen. The reported life zone for anise production is 8 to 23؛C with 0.4 to 1.7 meters of precipitation on a soil pH of 6.3 to 7.3. Anise develops best in deep, rich, well-drained, sandy and calcareous soils. Cold, loamy amounts to 1.5 to 3.0 g and should have a minimum purity of 90% and a minimum germination of 70%.

Tunc and Sahinkaya (1998), Sarac and Tunc, (1995) indicated that the essential oil of anise had a high residual toxicity to adults of *Tribolium confusum*, and was the most repellent to *Sitophilus oryzae* adults in food preference tests.

2.4 Plant description

Anise is an annual plant that reaches an average height of 30–50 cm. The plant is completely covered with fine hairs. The root is thin and spindle-shaped, the stemup, stalkround, grooved and branched upward. Anise is a cross-pollinating species and is genetically heterogeneous.

Commercially available aniseed usually contains the whole fruits and occasionally parts of the fruitstalk. The fruits with the style-foot are 3–5mm long, 1.5–2.5mm wide and 2–4mm thick. Vitae (oil ducts) are almost always present embedded in the fruit wall on the dorsal surface, sometimes in or directly beneath the ridges. The fruits are downy. Their color is grayish-green to grayish-brown. (Davis, 1972; and Heeger, 1956).

2.5 Medical uses

In folk medicine, anise is used as an appetizer, tranquillizer and diuretic drug (Tyler *et al*, 1988; and Lawless, 1999). The traditional use of period, Ouzo, Anisette, Rake, and many other anise-flavored drinks after a heavy meal is a familiar example of its antispasmodic effect, especially in the digestive tract (Hansel *et al*, 1999). Dried ripe fruits of anise, commercially called aniseeds (Anise fructose), contain the whole dry cremocap of anise (*P. anisum* L.). For medical purposes, they are used to treat dyspeptic complaints and catarrh of the respiratory tract, and as mild expectorants. It was also reported that extracts from anise fruits have therapeutic effects on several conditions, such as gynaecological and neurological disorders (Czygan,1992; and Lawless 1999). Ethanolic extract of anise-fruits contains *trans*-anethole, methylchavicol (estragole), eugenol, psedoisoeugenol, anisaldehyde, coumarins (umbelliferon, scopoletin), caffeic acid derivatives (chlorogenic acid), flavonoids, fatty oil, proteins, minerals, polyenes and polyacetylenes as its major compounds (Hansel *et al*, 1999).

The Romans discovered that anise seeds and others aromatic spices helped digestion and they used anise as an ingredient of a special cake. They also used anise seed in perfumes. The peoples of Asia Minor and Greece used it for many medicinal applications (Dwyer and Rattray, 1997).

In Turkish folk medicine this plant, and especially its seeds has been used as an appetizer, diuretic and tranquillizer. Anise seed is used extensively in an alcoholic beverage (rake) in Turkey (Gulcin in *et al*, 2003). The parts of the plant used are its leaves, seeds and oil. Fresh leaves are added to salads, vegetables and various cooked dishes in various countries. The seeds are used to flav or confectionery (especially aniseed balls), dried figs, cakes, bread and curries. Seeds and oil form the basis of all anise-flavored drinks, such as Period, ouzo, rakÝ and arak, which turn milky when diluted with water. In addition, its oil is used commercially in perfumery, tobacco manufacture (Ates and Erdogrul 2003).

2.6 Main uses in food processing

Are used as flavourant, culinary, household, cosmetic and medicinal. Aniseed is one of the oldest spices used widely for flavouring curries, breads, soups, baked goods such as German springerle, and Italian biscotti, sweets, dried figs, desserts, cream cheese, pickles, egg dishes, non-alcoholic beverage. Anise and anise oils are used in Italian sausage, pepperoni, pizza topping and other processed meat items. Anise is an essential component of Italian anise cake and cookies. All parts of the plant can be used in the kitchen. The flowers and the leaves can be added to fruit salads. Freshly-chopped leaves also enhance dips, cheese spreads, vegetables, or green salads. Mixed into stews and soups. (Schuster, 1992; Peter, 2001; Tainter and Grenis, 1993; Bown, 1998; and Hansel *et al*, 1994)

The essential oil is valuable in perfumery, in dentifrices as an antiseptic, toothpaste, mouthwashes, soaps, detergents, lotions and skin

creams, in tobacco manufacture, with maximum use levels of 0.25% oil in perfumes. It is also used to mask undesirable odors in drug and cosmetic products. The oil is used for production of anethole and sometimes as sensitizer for bleaching colors in photography.(Leung and Foster, 1996; Peter, 2001; and Arctander, 1960).

2.7 Chemical composition

Peter (2001) found that volatile oil 1-4%; coumarins and its salts (palmitate and stearate); flavonoid glycosides: quercetin-3-glucuronide, rutin, luteolin-7-glucoside, isoorientin, isovitexin, apigenin-7-glucoside (apigetrin) etc; myristicin; ca. 18% protein; ca. 50% carbohydrate and others.

Fatty oil shows excellent future potential. Successful production of anise seed for economical oil production would probably occur if the seed yields could be improved significantly, and high content of oil and essential oils and large quantity of petroselinic acids could be reached.(Schuster, 1992; and Leung and Foster, 1996).

2.8 Essential oil content of Anise

The essential oil contents of anise seeds were reported by Reineccius (1994), Schuster (1992), Ashurst (1999) and Baytop (1984) as 1.5-6.0 %, 1.5 - 6.0 %, 2.5 % and 2.0-4.0%, respectively. The main component of the essential oil was trans-anethole. Santos *et al*. (1998) also recorded that trans-anethole was the main compound of anise essential oil.

2.9 Functional properties

The pharmaceutical data mentioned in the literature mainly refer to anise oil and anethole. Anethole is structurally related to the catecholamines adrenaline, noradrenaline and dopamine.(Newall *et al*, 1996) Anise oil and anethole have a number of functional properties (antibacterial, antifungal, antioxidant, stimulant, carminative and expectorant).

The antibacterial activities of the essential oil distilled from *Pimpinella anisum* against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli* and *Corynebacterium ovis* were evaluated. Against *S. pyogenes*, aniseed oil was equally effective in the pure state and at dilution up to 1:1000. Against *C. ovis*, aniseed oil was equally effective at dilutions up to 1:100 and at higher dilutions.(Gangrade *et al* 1990).

Kubo,(1993) reported that anethole, a naturally occurring henylpropanoid extracted from aniseed, exhibited a broad antimicrobial spectrum and the antifungal activity (against *Candida albicans*) of two sesquiterpene dialdehydes, polygodial and warburganal (extracted from *Polygonum hydropiper*), was increased 32 fold when combined with low concentrations of anethole. In a study of the volatile oil from aniseed, significant antifungal activity against members of the genera *Alternaria, Aspergillus, Cladosporium, Fusarium* and *Penicillium* was recorded at concentrations of 500 ppm, the active constituent having been identified as anethole.(Shukla and Tripathi, 1987).

Anethole also inhibits growth of mycotoxin producing *Aspergillus* species in culture. Anethole has been reported to be mutagenic in Ames *Salmonella* reversion assay. Anethole, anisaldehyde and myristicin (in aniseed), along with d-carvone (present in *P. anisum* plant), have been found to have mild insecticidal properties (Leung and Foster, 1996). Pharmacological studies were carried out in rats and mice, and anise oil showed significant antipyretic activities in rats (Afifi *et al*, 1994).

Curtis, (1996) reports that synthetic versions of compounds in herbs and spices such as *trans*-anethole have inhibitory and lethal activity against food spoilage yeast *Debaromyces hansenii*. There is some evidence of anise oil's effectiveness as an antioxidant.

Gurdip *et al*, (1998) investigated the antioxidant activity of essential oil from spice materials on stored sunflower oil and found that anise oil possessed excellent antioxidant effects, better than those of synthetic antioxidant, butylated hydroxytoluene.

Anise oil is used as carminative, stimulant, mild spasmolytic, weak antibacterial, and expectorant in cough mixtures and lozenges, among other preparations, Anise may have other potential health benefits. The effect of the beverage extracts anise on absorption of iron was tested in tied-off intestinal segments of rats. Results showed that the beverage of anise promoted Fe absorption. (Leung and Foster, 1996; and Bisset, 1994).

2.10 Anise in poultry diets

Ciftci *et al* (2005) investigated the use of anise oil in broiler nutrition as a natural growth promoting substance instead of antibiotics. Different levels of anise oil were added to a standard diet, to determine its effect on feed intake, daily live weight gain and feed conversion ratio compared to control and antibiotic groups. Experimental groups were as follow: A Control group with no anise oil or antibiotic added, a 100 mg/kg Anise oil group, a 200 mg/kg Anise oil group, a 400 mg/kg Anise oil group with corresponding inclusion levels, and an antibiotic group with 0.1% added antibiotic (Avilamycin). The feed intake was similar in all groups. The highest ($p<0.01$) daily live weight gain was observed on the supplemented with 400 mg/kg, Anise oil group and followed by Antibiotic group. The addition of 400 mg/kg anise oil to the diets was improved daily live weight gain by approximately 15% compared to the control group. Additionally, the addition of 400 mg/kg Anise oil to the diets was improved daily live weight gain by approximately 6.5% compared to the antibiotic group. The addition of 400 mg/kg Anise oil to the diets was improved feed conversion ratio by approximately 12 % compared to the control group. This improve was remained 7 % level in

antibiotic group. Additionally, the addition of 400 mg/kg anise oil to the diets was improved feed conversion ratio by approximately 6 % compared to the antibiotic group. 7. The authors concluded that, Anise oil could be considered as a potential natural growth promoter for poultry.

Bayram *et al* (2007) determine the effects of Aniseed (*Pimpinella anisum*) on egg production, egg weight, egg cholesterol levels, egg quality [egg shell thickness *(EST)* and haugh unit *(HU)*], There were statistical differences among the groups in terms of Feed Consumption , Feed Conversion Ratio and Egg Weight ($P<0.01$). Antibody levels were increased by aniseed positively ($P<0.05$). It is concluded that the aniseed could be used up to 4 % level in laying quail diets with beneficial effects on immune responses. However it is not recommended to be used at 5 % level because of its negative effects on feed intake and feed conversion ratio.

2.11 Cowpea as a source of protein:

Cowpea (*vigna unguiculata* L. Walp) is a widely distributed leguminous plant that is used as feed ingredient in diets for poultry and pigs (Murillo-Amado *et al* 2000).The proximate composition, contents of cowpea meals Crude protein of whole raw cowpea (24.57%), Crude fibre (2.70%),Crude fat (1.30%), Ash (3.60%)(Defang *et al* 2008).

Food legumes particularly vegetable cowpea is one of the most important sources of protein, carbohydrate and vitamins in the diet of many populations especially in developing countries (Philips and Watters,1991). However, the presence of the antinutritional factors commonly found in legumes is a major factor limiting the wider food use of such tropical plant (Liener, 1976). The presence of phytate in foods is known to lower the bioavailability of minerals (Eradman, 1979) and inhibits several proteolytic enzymes and amylases (Singh and Krikorian, 1982).

However, they contain indigestible oligosaccharides such as raffinose stachyose and verbascose (Onyenekwe *et al*, 2000), as well as protease inhibitors, principally anti-trypsin and anti-chymotrypsin (Besancon, 1999). Traditional processing methods such as boiling and soaking in water eliminate less than 50% of stachyose and raffinose from cowpea grains (Onyenekwe, *et al* 2000).

Defang *et al* (2008) used boiled cowpea in broiler diet, to evaluate performance and carcass characterizes, however during starter period, feed intake and weight gain were significantly ($P<0.05$) higher for broilers fed control diet compare to other treatments. Also they found no significantly difference for feed conversion ratio. At finisher carcass yield was significantly ($P<0.05$) higher for bride finished with boiled cowpea diet compared to other to other treatment.

Tshovhote *et al* (2003) studied the chemical composition and digestibility of three cultivars of cowpea relatively narrow range of protein concentrations (253.5 to 264.3 g/kg). The concentrations of amino acids (AA) varied among the cultivars. Dietary crude fiber levels varied from 51.5 to 58.1 g/kg. The cultivars were almost devoid of lipid and calcium, but were relatively high in phosphorus. The apparent and true metabolically energy (AMEn and TMEn) values ranged from 9.88 to 10.02 and 10.29 to 10.78 MJ/kg DM, respectively. The mean digestibilities of the AA's ranged from 72.8 to 81.0%, with methionine having the highest digestibility and lysine the lowest. Cowpeas appear to be suitable for use in poultry feeds, their composition being equivalent to plant protein sources such as lupins and field peas, but lower in most nutrients compared with soybeans and anola.

CHAPTER THREE

MATERALS AND METHODS

The experiment was carried out in the premises of the Faculty of Animal Production, University of Khartoum (Shambat). The experiment lasted for six weeks (July to August 2008) during which the highest and the lowest temperature 36-27^{o}C and humidity 46-32%.

3.1 Experimental Housing

The experiment was carried out in an open house located east-west from cemented brick walls, iron posts with netted. The house was partitioned into sixteen pens. Each of them one meter dimension. After burning and cleaning up every pen was covered with clean wood-shaving as bedding, each pen was provided will one round fountain drinker and one tabular feed trough, continuous lighting program was maintained for 24 hours naturally and artificially during the six week

3.2 Experimental birds

On hundred and twenty eight, one-day old commercial unsexed broiler chicks (hubbered), were purchased from Omat poultry company, located in west Omdurman state. Some sugar was added to the drinking water at first day. The chicks were selected on the basis of approximately same weight were assigned randomly for each dietary treatment with four replicates. They were reared eight birds per pen. Each pen represents a replicate. The initial body weight for birds was recorded.

3.3 Experimental diets

Four experimental diets were used in which cowpea (compose 20% of the diet) was the main source of protein and Anise additives, it was used to replaced in the diet by 0.0, 0.25, 0.50 and 0.75%. The diets were formulated

to meet nutrient requirements as outlined by NRC 1994, and they were approximately isocaloric and isonitrogenus.

Diet A control with 0% cowpea and anise, diet B contained 20% cowpea and 0.25% anisum, diet C 20% cowpea and 0.50% anise, diet D 20% cowpea and 0.75% anise. Vegetable oil added to diets to balance the caloric requirements. The dry ingredients of each treatment were mixed in the mixture then small amount was put aside to be mixed manually with oil, premix, common salt, lime stone and vitamins, then the whole quantity was mixed thoroughly by mixture.

The ingredient composition of experimental diets and the calculated chemical composition of the experimental diets were presented in table(3).

ME=1.549+0.0102CP+0.0275EE+0.0148NFE-0.0032CF.

3.4 Management and data collection:

One hundred and twenty eighty chicks were allotted to equally randomized groups among the experimental diets allocated randomly to these 16 pens. Natural and artificial light was available (13 and 11hours respectively) was maintained throughout the experimental period. Vaccination against new castle disease was carried out at day 7 and 21 in drinking water also gumboro vaccine at day 12 in drinking water. Parameters recorded weekly were body weight, feed intake and weight gain, feed conversion ration (FCR) were also calculate for the individual replicates of each dietary treatment.

Mortality was recorded when it occur. The experiment lasted for 6 weeks time, at the end of experimental period, 20 chicks were randomly selected from each dietary treatment (5 birds/replicate) and were tagged legs. These birds were weighted individually and slaughtered, scalded, manually, packed and allowed to drain. The hot carcass weight, was recorded and

dressing out percentage was determined by expressing hot carcass weight to live weight.

3.5 Chemical methods

Samples of cowpea, anise seeds and experimental diets were approximate analyzed on dry matter basis for chemical component according to AOAC (1984)

3.6 Experimental design and statistical analysis

The experiment was conducted following the completely randomized design. The data were subjected to analysis of variance according, Steel and Torie (1980), using **SPSS** computer programmer. The significance between treatment means analyzed by using Duncan multiple rang test.

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Table (1) Proximate analysis (%) of cowpea and anise

Compound	Cowpea	Anise
DM	95.51	95.80
EE	1.99	11.36
CP	23.06	20.97
CF	6.07	23.66
Ash	6.73	6.88
NFE	57.68	33.56
ME(Kal/kg)	2673	2465

ME Calculated according to equation.

Table (2): Chemical composition (%) of experimental diets (As fed):

Treatment	A	B	C	D
		Anise level %		
Ingredient	0	0.25	0.50	0.75
Sorghum	63.200	52,616	52.366	52.050
Groundnut meal	25.79	17.120	17.220	17.280
Super concentrate	5	5	5	5
Dical phosphate	0.66	0.765	0.765	0.765
Nacl	0.30	0.30	0.30	0.30
Premix	0.30	0.30	0.30	0.30
Cowpea	0.0	20	20	20
Oil	1.35	1.5	1.5	1.5
Wheat bran	2.5	1.200	1.1	1.1
Limestone	0.94	0.949	0.949	0.949
Total	100	100	100	100

**Super concentrate (%) CP 40, lysine 10, methionin 3, methionine+cystin 3.3, Ca 10, Available phosphorus 6.40, CF 1.44, C fat 3.90, ME 1750 kacal/ kg, crude minerals 39.30.

***Vitamin composition per kg of diet Vitamin A=200.000 IU, VitD3=70.000IU, B1=50mg, B2=120mg, B12=180mg, K3=30mg, Niacin440mg, Zincl1.6mg, Copper 450mg, Iodin 550mg, Selenium 8mg, Cobalt 9mg, Iron 58mg, Molyden 20mg.

Table (3): Calculated chemical analysis of experimental diets on dry basis

Compound	Diets			
	0	0.25	0.50	0.75
ME	3150.675	3150.100	3150.948	3150.487
CP	22.021	22.008	22.025	22.034
CF	4.474	5.381	5.376	5.380
EE	3.864	3.076	3.092	3.107
Ash	4.731	4.613	4.639	4.665
NFE	54.497	55.443	55.404	55.356
Calcum	1.013	1.013	1.014	1.014
Lysin	1.154	1.332	1.332	1.332
Methioinen	0.512	0.524	0.524	0.523
Meth+Cyc	0.741	0.691	0.691	0.691
A.Phosphorus	0.456	0.456	0.456	0.456

***A=Available**

CHAPTER FOUR
RESULTS AND DISCUSSION

Experimental birds looked apparently healthy and no mortality was recorded as result of inclusion of anise herb in broiler diet.

It was reported that Anise herbs possess antioxidant, antispasmodic, antiflammatory, antimicrobial and posses immune effect, there by so it can be use as natural feed additive. (Nalini, et al, 1998; Miura, *et a*l, 2002; Valero and salmeron, 2003).

The effect of addition of anise on weekly feed intakes is presented in table (5), the treatment had no significantly ($P>0.05$) effect on feed intake in the first-fifth weeks, but there is numerically enhanced feed intake, but feed intake significantly increase in week sixth. These effect may be attributed to the appetizing effect of the active ingredients compound, such as thymol, eugenol and anethole in present on anise. (cabuk *et al*, 2003).

There was significantly ($p<0.05$) improvement of the weekly weight gain of broiler chicks Fed anise up to week four (table 6). The response may be due to the essential oil of anise that may increase digestion of protein, cellulose and fat (Jamroz and Kamel, 2002). However on significant difference between the groups during the last week.

The total feed intake in presented table (7) there was significant ($p<0.05$) positive effect on feed intake with increasing level of anise, this may be attributed to the enhancement of palatability (cabuk *et al*, 2003).

Treatment had no significant effect on total weight gain between all treatments but there was improvement in weight gain with the utilization of anise in the diet, however Ciftic *et al* (2005), Obtained high gain with feeding 400 mg/kg anise oil to broiler. No variation ($P>0.05$) recorded total feed conversion ratio among experimental tested group present in table (7).

The overall feed intake, weight gain, FCR and general performance improved with in inclusion of anise up to (0.75%), may be due to active ingredient such as anethole, eugenol, methvhaviol, anisadhyde and estragole in anise, especially anethole and eugenol have digestive effects (cabuk *et al*, 2003). Their effected on pathogenic microorganism in the digestive system. Moreover previous review mentioned that essential oil derived from anise has antimicrobial and Antioxidant (Burt and reiders, 2004: Tabanca et al, 2003, Gulin et al, 2004). Similar results reported by Ather (2000), that broiler performance was improved when using poly herbal premix which including anise herbs.

The treatment had a significant effect on live weight the highest value obtained with 0.75% anise supplemented birds.

The result revealed no significant ($P>0.05$) effect on dressing percentage similar results was observed between all treatments.

Live and carcass weight coincided with positive feed intake and growth performance, however, positive results of these study reflect the best, similar results reported with essential oil derived from different aromatic plants which improved feed intake, feed conversion ration and carcass yield (Tuker, 2002; Ather, 2000), however, studies showed that essential oil of anise increased digestion of protein, cellulose and fat (Jamroz and Kamel, 2002), improved digestibility of the nutrient (Hernanez *et al*, 2004) and increased effect of pancreatic lipase and amylase (Ramakrishna *et al*, 2003).

This study conclude that the addition of anise herbs up to (0.75%) result in good response for, weight gain, feed intake and carcass yield.

Table (4) Effect of dietary Anise supplementation in weekly feed intake on broiler chickens (g/bird).

			Treatments		SEM
Week	0	0.25	0.50	0.75	
1	134.94[a]	129.25 [a]	145.94[a]	143.88[a]	6.939
2	305.31[a]	316.34[a]	334.81[a]	348.63[a]	15.183
3	393.63[a]	418.31[a]	419.88[a]	440.31[a]	21.428
4	573.75[a]	592.19[a]	585.94[a]	582.69[a]	14.594
5	632.18[a]	608.94[a]	605.00[a]	758.13[a]	48.547
6	738.72[b]	790.75[ab]	756.22[b]	837.72[a]	20.045

** [a,b,c] Values within rows with on common superscripts differ significantly (P<0.05).

SEM= Standard error of the mean.

Table (5): Effect of dietary Anise supplementation in weekly weight gain on broiler chickens (g/bird).

	Treatments				SEM
Week	0	0.25	0.50	0.75	
1	72.31^{b}	80.38^{a}	83.25^{a}	83.06^{a}	1.23
2	195.19^{b}	216.86^{a}	223.62^{a}	220.62^{a}	5.17
3	263.19^{b}	286.06^{a}	291.56^{a}	295.56^{a}	6.72
4	372.66^{ab}	356^{ab}	381^{a}	380.4^{a}	13.58
5	433.31^{a}	425.88^{a}	399.75^{a}	431^{a}	46.26
6	393.69^{a}	394.69^{a}	349.31^{a}	384.31^{a}	36.59

** ^{a,b,c} Values within rows with on common superscripts differ significantly ($P<0.05$).

SEM= Standard error of the mean.

Table (6): Effect of Anise supplementation on weekly FCR of broiler chicks (feed/gm weight gain/bird).

	Treatments				SE
Week	0	0.25	0.50	0.75	
1	2.04[a]	1.53[b]	1.75[ab]	1.73[ab]	O.103
2	1.84[a]	1.46[b]	1.50[b]	1.58[b]	0.072
3	1.56	1.46	1.44	1.51	0.061
4	1.56	1.68	1.54	1.80	0.101
5	2.24	1.43	1.51	1.78	0.390
6	2.78	2.01	2.18	2.56	0.340

** [a,b,c] Values within rows with on common superscripts differ significantly (P<0.05).

** SEM= Standard error of the mean.

Table (7) Effect of Anise on overall performance of broiler chicks (g/bird/6weeks).

Parameters	Treatments				SEM
	0	0.25	0.50	0.75	
Initial weight	44.44 [a]	43.45 [a]	45.38 [a]	45.63 [a]	8.4
Final weight	1774.74[a]	1804.44 [a]	1805.38 [a]	1840.63 [a]	88.4
Total intake	2778.5[b]	2855.8[ab]	2847.8[ab]	3111.4[a]	90.699
Total gain	1730.3[a]	1761[a]	1760[a]	1795[a]	70.293
Total FCR	1.60[a]	1.62[a]	1.61[a]	1.73[a]	0.084

** [a,b,c] Values within rows with on common superscripts differ significantly ($P<0.05$).

* FCR= Feed Conversion Ratio.

* SEM= Standard error of the mean.

Table (8): Average Pre-slaughtered, carcass weight and dressing percentage of broilers fed diets containing Anise during 0-6 weeks (g/bird/6weeks).

	Diets				
Parameters	0	0.25	0.50	0.75	**SR**
Pre-slaughtered	1484.50^{c}	1795.15^{ab}	1712.35^{b}	1862.75^{a}	44.32
Carcass weight	1018.10^{c}	1234.4^{0ab}	1182.55^{b}	1288.45^{a}	34.27
Dressing	68.48^{a}	68.68^{a}	69.05^{a}	69.44^{a}	0.57

** ^{a,b,c} Values within rows with on common superscripts differ significantly ($P<0.05$).

**SEM= Standard error of the mean.

Table (9): Feeding Economics of the experimental groups:

A-Total costs*

Item	Anise level %			
	0	0.25	0.50	0.75
Chicks purchase	86.4	86.4	86.4	86.4
Feed	120.49	150.76	159.11	162.84
Management	35.4	35.4	35.4	35.4
Total costs(SDG)	242.29	272.56	280.91	284.64
Total costs (dollars)	93.18	104.83	108.04	109.48
Cost/bird(SDG)	7.57	8.51	8.77	8.89
Cost/bird(dollars)	2.34	2.28	2.34	2.44

B-Total returns

Item	Anise level %			
	0	0.25	0.50	0.75
Average weight of bird(kg)	1.221	1.241	1.253	1.371
**Price kg.of bird(SDG)	11.5	11.5	11.5	11.5
Total returns(SDG)	14.03	14.29	14.40	15.77
Total returns(dollars)	5.42	5.50	5.54	6.06
Returns/bird(SDG)	6.51	5.79	5.63	6.88
Returns/bird(dollars)	2.5	2.23	2.17	2.65

CONCLUSION AND RECOMMENDATION

- Anise fed to broiler chicks enhanced feed intake and body weight.

-Live weight and carcass weight significantly increases by increasing the level of anise. Chicks can tolerate up to 0.75% anise as natural herb.

- Since Anise has antimicrobial effect so it can be use as natural growth promoter for birds chicks.

-Further study would be conducted to determine the effect of anise supplement in broiler diet with different feed ingredient.

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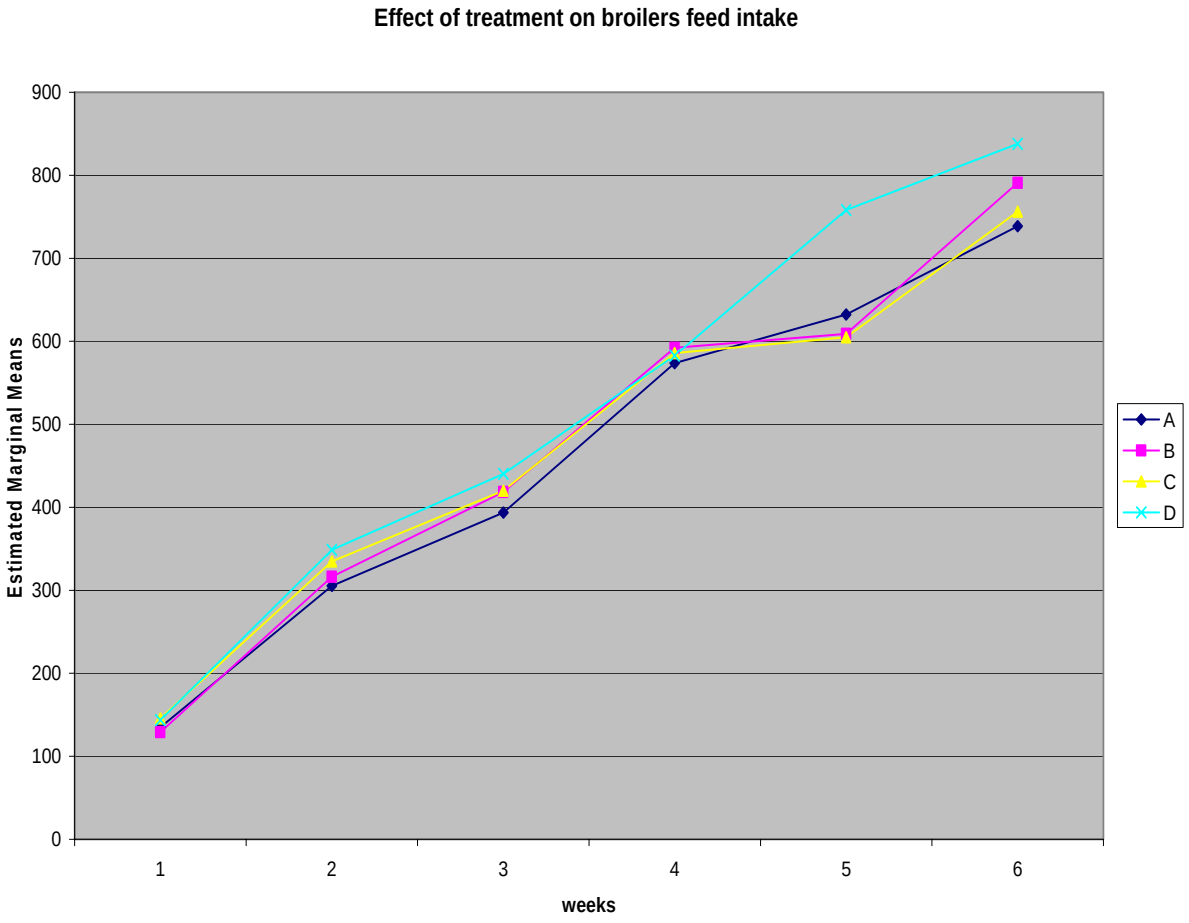
APPENDIX ll


Effect of treatment on broilers feed intake
Estimated Marginal Means
900
800
700
600
500
400
300
200
100
0
1
2
3
4
5
6
weeks
A
B
C
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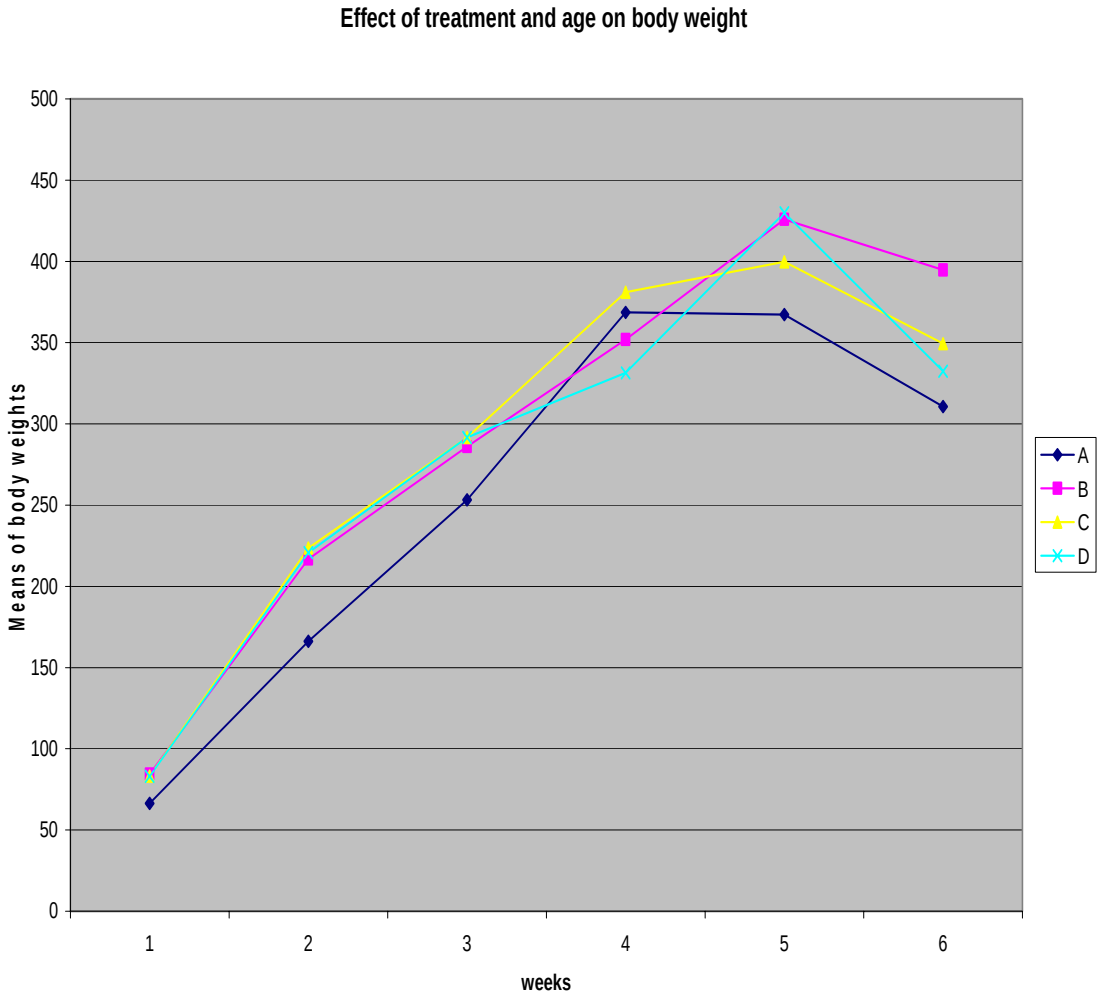
APPENDIX lll



APPENDIX VI

Average live weight, hot weight and dressing percentage of broilers fed diets