Sudan University of Science and Technology
College of Graduate Studies

Growth Performance and Blood Profile of Broiler Chicks Supplemented with Ultramin and Supervit Via Drinking Water

أداء النمو وخصائص الدم لكتاكيت اللاحم المضاف إليها الترامين والسوبرفيت عن طريق ماء الشرب

A dissertation submitted in Partial Fulfillment for the Requirements of the Degree of Master Science (Animal Production)

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الآية

بسم الله الرحمن الرحيم

قال الله تعالى:

﴿ أَوَلَمْ يَرَوْا إِلَى الطَّيْرِ فَوْقَهُمْ صَافَّاتٍ وَيَقْبِضْنَ مَا يُمْسِكُهُنَّ إِلَّا الرَّحْمَنُ إِنَّهُ بِكُلِّ شَيْءٍ بَصِيرٌ ﴾

صدق الله العظيم

سورة الملك الآية ﴿ 19 ﴾

Dedication

To My Mother Soul, Father, brothers and sisters

To my extended family

To all my teachers and friends with great regard and Respects

Acknowledgement

Firstly and lastly thanks to Allah who gave me persistence and Patience to complete this work. No Words can adequately express my deep gratitude to my supervisor **Prof. Dr Mohamed Hassan Musa Tabidi** for generously providing and for patience, constant support, advices and insight was invaluable to me. He is always available not only for consultation but also to solve my difficulties. Then I wish to express grateful thanks to administration of Sudan University of Science and Technology, College of Agricultural Studies, for all members of Animal Department Production Department for all owing me to conduct my research and providing any assistance requested. Special thanks to all people help me in this research.

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Abstract

This experiment was conduct to evaluate the effect of adding ultramin and supervit (vitamins) into the drinking water on the growth performance and blood serum chemistry of broiler chicks. A total of 72, seven days old broiler chicks were divided into 3 equal groups (A ، B and C) and each group was subdivided into 3 replicates, each replicate consisting 8 chicks per each following a completely Randomized Design technique. All experimental chicks were fed on the basal diet .chicks in group A were fed a balanced broiler diet ad libitum and

supplemented with ultramin 10 g dissolved in drinking water, group B was treated with supervit 5 g in drinking water and chicks in group C were used as control group(No vitaminsin drinking water) , for 42 days . Experimental parameters covered the performance (body weight, weight gain, feed intake and feed conversion rate) and blood serum chemistry.

Result showed no significant difference in performance of experimental broiler chicks and non- carcass components except, gizzard which showed significantly heavy weight an ultramin compared to control group.

Blood serum analysis showed that chicks treatment with supervite recorded significant increase on the concentration levels of SGPT and SGOT enzymes and triglyceride ,however no significant differences were recorded between tasted groups in the concentration levels of cholesterol and uric acid ,both treated groups recorded significantly increase in concentration level of calcium.

Result revealed that both commercial vitamins (supervite and ultramin) can be used via in drinking water for broiler chicks without any adverse effects on the broiler performance.

الملخص

أجريت هذه التجربة لدراسة أثر أضافة الفيتامينات الترامين ,,وسوبرفين التجارية لماء شرب الدجاج اللاحم (محفزات نمو) على أداء الدجاج اللاحم وتقيم التحليل الكميائي لبلازما الدم.

تم أستخدام النظام العشوائي الكامل **CRD**في هذه التجربة حيث تم أستخدام عدد (72) كتكوت لاحم من سلالة ابرس في عمر أسبوع غير مجنسة وقسمت عشوائياً الى (3) مجموعات تجريبية متساوية تقريبا في الوزن الأبتدائى وكل مجموعة بها (3) مكررات وبكل مكرر (7) كتاكيت ثم أضافة الترامين لمجموعة الأولى **A** وأضافة سوبرفين لمجموعة الثانية **B** وأما المجموعة الثالثة بدون أضافة .

تم تكوين عليقة أساسية وفقاً للاحتياجات الغذائية طبقاً لتحليل الكميائي للعليقة بجدول (3.3) تمت الغذائية على العليقة التجريبية لمدة (5) أسابيع وتمت المراقبة اللصيقة لصحةالقطيع وتسجيل قياسات الأداء الانتاجي الوزن المكتسبة والعليقة المستهلكة ومعدل التحويل الغذائى ونسبة النفوق بنهاية التجربة.

أثبت النتائج المتحصل عليها أن مجموعات الكتاكيت التجريبية لم تظهر فروقات معنوية($P\geq 0.05$) في الأداء الانتاجي ((الوزن المكتسب أستهلاك العليقة ومعدل التحويل الغذائى) ولم تسجل أى نسبة نفوق في الكتاكيت يعزى هذا نسبة أجراءات الأمن الحيوي العالية وأضافة الفيتامنيات تلعبت دور في حفظ الطيور).

أما التحليل الكميائي للبلازما الدم لم تظهر فروقات معنوية ($P\geq 0.05$)في أنزيم الالكاين فسفوتيز والصوديوم الكسترول واليوريا بنيما توجد فروق معنوية ($P\leq 0.05$)في الكالسيوم و **Triglyceride**وانزيم **SGOT**ووجود أعلى فرق معنوى($P\leq 0.01$) في أنزيم **SGPT**.

CHAPTER ONE
Introduction

CHAPTER ONE
Introduction

The poultry industry, in Sudan faced, feed crisis because of high cost of production which attributed to the raise cost of feed ingredients mainly imported n (**Mukhtar *et al* 2010**).In Sudan, concentrates have been used till now in poultry production due to its vital role to complete the protein and microelements in poultry feeds so, to maximize the growth performance of birds .The poultry feeding costs constitute about 70% of the total costs of poultry production because of that the development of poultry industry depends on the large extent on the availability of feedstuffs that are used or can be made suitable for use in poultry nutrition (**Babiker *etal.*,2009**) .Some of major issues faced by the poultry industry are about ; improving efficiency of production ,reducing environmental pollution resulted from litter and reducing food cost. In general, to meet these challenges, series of attempts have been mode by researchers. Trails of poultry feed additives to improve growth performance ,reduction of specific nutrient concentration or manipulation of nutrient utilization such as trace mineral nutrient to reduce feed cost and nutrient excretion .Public health safety is a major global concern relative to animal predication .Therefore , animal production systems need to focus not only on increasing productivity ,but also on the impacts of production on the environment, both on animal and human health (**Ferket,2003**).

Feed antibiotics used as growth promoters allow better performance **(Dibner and Richards, 2003)**.However, the possible relationship between –feed antimicrobials and the increasing of bacterial resistance in animal and humans to antibiotics resulted in the adoption of new measures to control this type of chemical (**Ferket, 2003; Jin, 1997**).

Essential oils derived mainly from spices and herbs and their purified compound have been shown to have antimicrobial actions in vitro(**Cowan, 1999 ;Ultee *et***

***al*, 2002; Faleiro *et al*., 2003).**Example of such natural antimicrobial compounds are caracole ,Tyrol limonene and cineole that are present in the essential oil fraction of oregano ,laurel ,sage and myrtle (**Riebau *etal*.,1997 ;Ultee *et al* .,2002).**

Vitamins are defined as group of complex organic compounds present in small amount in natural food stuffs that its deficiency in the diet causes deficiency disease. Because of the possibility of specific biosynthesis pathway in some species, some vitamins such as carnation could be considered only as essential metabolites (**Harsh, 2015**).

Vitamins are divided into two categories: fat-soluble and water-soluble. The fat-soluble vitamins are A, D, E, and K. The water-soluble vitamins include vitamin C and the B vitamins.

Poultry can make vitamin C, so there is no dietary requirement established for this vitamin. Vitamin C supplementation is useful when birds are in stress.

The need of poultry form vitamins reach between 1.4-2.2 kg from 6-8 week (Asaniyan *et al*., 2007)

Nutrition reflected in the bird's performance. The most convenient way of feeding chickens considerably depending upon ingredients composition.

In the content of a particular feedstuff indoors or allowed to range outdoors. Most diets affected by, region, season and processing conditions and vary widely, depending upon the main dietary ingredients.

Essential amino acids and non-essential amino acids must be supplied by the diet, to prevent the conversion of essential amino acids into non-essential amino acid. Additionally, if the amino acids supplied are not in the proper, or ideal, ratio in relation to the needs of the animal, then amino acids in excess of the least limiting

amino acid will be delaminated and likely used as a source of energy rather than towards body protein synthesis. This breakdown of amino acids will also result in higher nitrogenous excreta.

The Objectives of this study:

This study aimed to evaluate the efficacy of using Ultramin (vitamins, essential amino acids)and (vitamins) in comparison with Supervit on the growth performance and serum blood profile of broiler chicks.

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CHAPTER TWO

LITERATURE REVIEW

CHAPTER TWO

LITERATURE REVIEW

2.1 Feed Additives:

Feed additives are defined as *produc*tsucts that are used in animal nutrition for purposes of improving the quality of feed and feed from animal origin, or to improve the animal performance and healthy, (Regulation (EC) NO 1831/2003).

feed additives, are sometime included in the mixture in very small quantities and with careful weighting, handling mixing, to insure that dietary nutrients are ingested, digested, protected from destruction, to cells of the body .Other feed additives have been used to alter the metabolism of the chicken in an effort to produce better growth or more desirables finishing products (Leesons and Summers, 2001).

Feed additives can be used to increase the health status; fertility and performance of animal .They improve the feed conversion ratio mainly by regulating feed intake and increasing digestibility of nutrients and energy (Gibson and Rober, 1995).

2.1.2. Strategies of Using feed additive:

The European Union (EU) in 2006 banned antibiotic growth promoters used as additives in animal feed (Hashemi and Davoodi, 2010).

Hence, large investment have been made by researchers and multinational companies in order to investigate alternative products to maintain growth and performance in poultry and at the same time, take consideration into the demands of consumers that the new antibiotic-replacers must be safe, acceptable and healthy .Consequently ,an intensive search for alternatives such as probiotics,symbiotc ,enzymes, toxin binders , organic acids ,organic minerals ,oligosaccharides and other feed additives has started in last decade

(Griggs and Jacob, 2005;Owens *et al*.,2008; Abdulla *et al*.,2011;1999 and Sarker *etal.,2010*).

2.2Antibiotics:

The term of antibiotic growth promoter is used to describe any medicine that destroy or inhibit and is administered at a low, sub therapeutic does.

2.2.1 The Use of Antibiotics:

Antibiotics have long been used as a feed additive to increase broilers growth performance and control of disease (Chen *et al .,2009*).

The use of Antibiotics, including chlortetracycline as growth promoter to increase production performance and to decrease mortality, was recommended to be banned by European Union (Perreten2003).

Since that time there has been growing concern that the use of antibiotics as growth promoter was resulting in the development of resistant population of bacteria which made subsequent use of antibiotics for therapy difficult (Mmereole ,2010 ;Sarker *e al.,2010*) .

Since the permitted antibiotics and other chemical feed supplements have been widely used. Recently, however, they have come under renewed scrutiny from the anti-additive lobby and some supermarkets are already selling antibiotic-free meat. There is also a reaction against the use of antibiotics as therapeutic because of the intestinal upsets which often follow oral treatment with these agents Although they are effective in curing the disease for which they are prescribed . The effect on the indigenous gut flora may persist after cessation of the treatment .the possibility of antibiotics ceasing to be used as growth stimulants for farm animal and concern about the side effect of their use as therapeutic agent has produced acclimate in which both consumer and manufacturer are looking for alternatives . Bedford. (2000) pointed out that the growth –promoter effect of

antibiotics in animal diets is clearly related to the gut micro flora because they exert no benefits on the performance of germ-free (GF) animals.

2.2.2Negative Impact for Antibiotics:

Antibiotic use in animal, however, is potential problem for human medicine because resistant bacteria can pass through the food chain to people .As result of increasing concerns over the transfer of resistance between different bacteria and between human and animals (Hashemi and Davoodi, 2010) .The reduction of antibiotics in poultry feed is critical for human health due to the contamination of meat products with antibiotics residues (Engberg *et al., 2001;* Apajalahti *et al. ,2004*).

This because increases in microbial resistance to antibiotics and residues in chicken meat products can be harmful to consumer's .the control of infections and enhancement of live performance through a non-antibiotic approach is thus urgently required. Consequently, several alternatives have been investigated to reduce or replace antibiotics. Because of the general problem of increased resistance of bacteria and the decreasing acceptance of the consumers for Antibacterial Growth Promoters (AGPs), different substances, referred to as Natural Growth Promoters (NGPs) have been identified on effective and safe alternatives to AGPs (Fuller 1992).

2.3 Probiotics:

Supplementation plays a crucial role in countering enteric bacterial infections (Mulder, 1991; Nava et *al.,* 2009; Van Coillie et *al*., 2007). Different *Lactobacillus* strains have protective effects on raw chicken meat against *Listeria monocyte* genes and *Salmonella enteriditis* (Maragkoudakis *et al.,* 2009). Supplementation of *L. johnsonii* FI9785 strain had reduced the necrotic enteritis caused by *Clostridium perfringens* (La Ragione *et al*., 2004; Rai *et al*., 2013). *Bacillus longum* have capability to survive in gastrointestinal tract of chicken and

have considerable antimicrobial activity against *Campylobacter* infection and therefore helpful in reducing the contamination of the intestinal pathogen at the farm level and in the chicken meat (Santini *et al*., 2010). *Bacillus licheniformis* have been found beneficial in increasing the productivity and meat quality in broilers poultry (Liu *et al*., 2012). Dietary probiotics have been found beneficial in increasing the performance of broiler chickens experimentally challenged with *E. tenella* (Giannenas *et al*., 2012).

In broiler chicks diet, probiotics improved the immune response significantly (Cotter *et al*., 2000; Panda *et al*., 2000). Probiotics feeding also have been reported to improve antibody titrates against viral diseases like Newcastle Disease (ND) and Infectious Bursal Disease (IBD) (Talebi *et al*., 2008). Probiotics augment the bird's resistance to fight off infectious pathogens and limit the negative growth effects of pathogenic microbes. By reducing the intestinal pathogenic microbial load, probiotics lower the pathogen spread in the poultry house via fecal contamination. A multi strain probiotic need to be used timely and regularly in feed for preventing various infectious agents including bacterial, fungal, protozoan and viral agents. Probiotics can reduce the flock mortality occurring due to immunosuppressive diseases (IBD, chicken infectious anemia, reoviral infections, Mare's disease, mica toxins etc) (Dhama *et al*., 2011).

Use of probiotics is recommended in newly hatched chicks to establish gut microbial balance and prevent early chick mortality; stressful conditions like during de-worming, overcrowding, vaccination, temperature and environmental stresses, change of feed/ingredients, management (shifting/transportation, contamination, gastro-intestinal disturbances (scouring, loss of appetite, poor digestion and absorption of nutrients). Nowadays, application of probiotics is being recommended during antibiotic therapy for maintaining the required intestinal balance of microflora and reducing diarrhea, without affecting the efficacy of

antibiotics. Probiotics have been considered as good alternatives to antibiotic growth promoters which help in limiting antibiotic residues in poultry products and the development of drug resistant microorganisms (Dhama *et al*., 2011).

Seeing the residual effect of antibiotics observed in poultry products and generation of antibiotic resistant strains, both having public health significance, nowadays, the use of probiotics as substitute for antibiotics in poultry production has become an area of great interest (Dhama *et al*., 2011).

2.4 Organic acids:

The utilization of organic acids has been increased as growth promoters in animal agriculture, which could help in providing protection from adverse human health implications. In poultry diets, the use of organic acids elicits a positive response in performance of broiler growth. In order to inhibit growth of bacteria of intestine (those which compete with host for the nutrients that are available) there is requirement of dietary acidification thereby causing reduced possibility of availability of bacterial metabolites which are toxic in nature. In the ceaca as well as small intestine it has been suggested by a number of studies that organic acids affect the bacterial concentration. In the crop of the poultry birds they are bactericidal for *Salmonellae* (Gaglo-Disse *et al*., 2010; Cengiz *et al*., 2012). In the young ones, acid production in the gut is insufficient and acidifiers are sometimes used in feeds to compensate it. The use of organic acids such as formic, lactic, prop ionic, citric, sorbic and phosphoric acids optimizes the balance of the microflora of the gastrointestinal tract Griggs and Jacob, 2005; Emami *et al*., 2013). They lower the pH, at which the activity of proteases and beneficial bacteria is optimized and proliferation of pathogenic bacteria is minimized by a direct antibacterial effect destroying their cell membranes (Chowdhury *et al*., 2009). The Medium-chain, Fatty Acids (MCFA), caproic, caprylic and capric acid, are also capable of inhibiting the growth of pathogenic bacteria at low concentrations in vitro. The

organic acidifiers are thus considered effective and recognized as safe, with no concern over getting into human food chain.. Explanation has been given by Brul and Coote (1999) regarding the salient basic principle of the mechanism of action of organic acids on bacteria which indicates that organic acids that are non-dissociated undergo penetration of the cell wall of bacteria that is otherwise known as pH sensitive which means that a wide margin of external as well as internal pH cannot be tolerated. Various organic acids viz., formic, fumaric, propionic, lactic as well as ascorbic acids acidify the diet and help to decrease pathogen colonization as well as toxic metabolite production; digestibility of protein as well as calcium and phosphorus; magnesium and zinc are improved. Various studies have demonstrated that organic acid supplementation in diet of broilers improves the growth performance and reduces diseases as well as problems associated with management (Gunal *et al*., 2006; Islam *et al*., 2008; Ao *et al.,* 2009).

With the advancement of research in exploiting the usage of organic acids, certain volatile short-chain fatty acids like butyric acid, are identified as a bacteriostatic agents against the gram-negative bacteria (Hirshfield *et al*., 2003)

2.5Vitamins and minerals:

As premix in feed of poultry (particularly in feed of broilers), multivitamin-minerals have been used for improving the broiler growth as well as feed utilization thereby helps in realization of better return of production as well as economy. Their performance level is optimum when there is poor health condition of the birds (Prescott and Baggot, 1993; Peric *et al*., 2009). They also exert beneficial effect on health of gut as well as immunity along with immune performance. Positive effect is exerted via better appetite even though there is variation in mechanism of action. Along with this, there is improved conversion of feed, immune system stimulation, growing vitality as well as regulation of the microflora of intestine. In terms of improvement of utilization of feed as well as

metabolism and minimization of various stresses all the vitamins (especially vitamin C) have essential roles to play (Sahin *et al*., 2003). Ascorbic acid or vitamin C is also having the ability to reduce the weight loss in birds due to heat stress. It resulted in enhanced performance in broiler chicks exposed to multiple concurrent environmental stressors (McKee and Harrison, 1995). In addition to ascorbic acid, tocopherols or vitamin E-supplemented diets resulted in better growth performance, by improving the feed conversion efficiency. Vitamin E is available in two forms: Tocopherols and tocotrienols. After absorption, vitamin E is hydrolyzed in its unsterilized form. L-arginine can also be supplemented with vitamin C for obtaining better meat quality. There is reduction in the effect of diet that is modified on the iron concentration in the liver as well as spleen and copper in heart (Al-Darajih and Salih, 2012a).

According to NRC (1994), in normal conditions for satisfactory performance of the birds, the recommended dose of vitamin E ranges from 5-25 IU kg-1 of feed. However, higher doses than this have been tested to improve the performance of the poultry. Vitamin E is added into the animal feed to enhance performance, to improve immune response and to increase vitamin E content in animal meat (McDowell, 1989). Vitamin C or L-ascorbic acid is an antioxidant vitamin which is naturally synthesized by the birds (Khan, 2011). Avian species synthesize ascorbic acid by an enzyme, gulonolactone oxidase, which is required for the biosynthesis of this vitamin and is lacking in humans and some other species (Lin *et al*., 2006; Khan, 2011). Hence no recommendation for this vitamin has been established by NRC for birds (NRC, 1994) but it has been recommended in poultry feed to alleviate stress on the assumption that during stress the requirements may exceed the synthesizing ability (Gous and Morris, 2005). Chickens require vitamin C for the metabolism of amino acid and absorption of minerals especially for maintaining dietary iron in reduced (ferrous) form and for the synthesis of

hormones (McDowell, 1989). Recently, there is a considerable interest in a possible nutritional role of ascorbic acid on the basis that the requirement of this vitamin may augment during heat stress (Lin *et al.*, 2006). Supplementation of heavy metals such as zinc has some beneficial effect by influencing intestinal microflora but may lead to spread of antimicrobial resistance (Bednorz *et al.*, 2013). Similarly, iron is also having dual role as growth inhibitor as well as growth promoter (Visca *et al*., 2013). The role of dietary phosphorus for body weight gain in broilers is quiet noteworthy (Abudabos, 2012)

2.6Exogenous enzymes:

The exogenous enzymes through the feeds include Non-Starch Polysaccharides (NSP) degrading enzymes, proteases and phytase that would help in better utilization and reduction in environmental pollution. In poultry feeding, the fiber component of the feed is considered as waste as these compounds are often called as NSP, an anti-nutritive factor. Barley, wheat and rye contain β-glucans, arebinoxylans or pentoses as NSPs, respectively. Most of the grain endosperm cell walls consist of mixed-linked arabinoxylan and β-glucan (Chesson, 1993). These NSPs have a negative effect on broiler performance (Choct and Annison, 1992) and depressed the growth rate (White *et al*., 1981) by encapsulating the nutrients, increasing the intestinal viscosity; increase endogenous nitrogen flow and bacterial fermentation in the gastrointestinal tract, reduced feed passage rate resulting in overall reduced feed intake to depress production in broilers and cause sticky droppings, vent pasting and dirty eggs (Yin *et al*., 2004). Arabinoxylan and β-glucans present in rice grain also interferes with nutrients digestion and absorption (Graham *et al*., 1988) and also decreases the production of digestive enzymes (Ikegami *et al*., 1990) in gastro-intestinal tract. The digestibility of starch, nitrogen (Hesselman and Aman, 1986) and fat (Edney *et al*., 1989) were reduced as a result of increased intestinal viscosity. The addition of β-glucanase along with the barley

helps to overcome these depressive effects. Hence, these Non-Starch Polysaccharides (NSPs) are degraded using enzymes such as xylanases and beta-glucanases, play an important role in reducing the pathogenic bacteria such as *Clostridium perfringens* (Jackson *et al*., 2003). These enzymes reduce the harmful effect of NSPs such as (hemi) celluloses, pectin's and oligosaccharides, arabinoxylans and β-glucans. NSPs have anti-nutritive effect by increasing the bulk and viscosity of intestinal content ultimately reduces the digestion and absorption of nutrients in intestine (Choct *et al.,* 1996; Ao *et al*., 2009; Hedemann et *al.,* 2009; Huyghebaert *et al*., 2011)

2.7. Essential oils:

Essential oils are a mixture of oily aromatic compounds obtained from different plant materials such as their flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruits and even their roots (Gopi *et al*., 2014). These are also called as volatile or ethereal oils, which are obtained from plants. It is a mixture of low-boiling-phenylpropenes and terpenes. Till date, about 3000 essential oils are known and they are having beneficial effect in lipid metabolism, stimulation of digestion and have antimicrobial, antioxidant and anti-inflammatory effect (Bishop, 1995; Botsoglou *et al*., 2004; Rota *et al*., 2004; Platel and Srinivasan, 2004). Dietary supplementation of essential oils like capsaicin, cinnamaldehyde, carvacrol, garlic powder, thymol powder etc., improved the performance of broilers and carcass yield (Jamroz *et al*., 2003; Demir *et al*; Cross *et al.,* 2004; Alcicek *et al.,* 2003). In turkey, the feed conversion ratio was increased by supplementation of oregano leaves (Bampidis *et al*., 2005). Essential oils from *Euphorbia hirta* reduced the concentration of *Clostridium perfringens* in the intestines of broiler chickens (Mitsch *et al*., 2004). Essential oils such as oregano and garlic oil inhibit microorganisms like *E. coli* and other *Enterobacterial* counts, *Clostridium* count, *Staphylococcus aureus*, *Salmonella typhimurium* and *Listeria*

mono cyto genes (Singh and Shukla, 1984; Kumar and Berwal, 1998; Aligiannis *et al.*, 2001; Ross *et al*., 2001; Friedman *et al*., 2002; Kirkpinar *et al*., 2011). For the animals, essential oils not only act as anti-oxidants in vivo but their anti-oxidant action help to prolong the feed shelf life (Gopi *et al*., 2014).

Clay minerals: Clay minerals containing molecules like silicon, aluminum and oxygen, are formed by tetrahedral and octahedral layers. There can be binding as well as immobilization of materials that are toxic in nature in the gastrointestinal tract when there is addition of clay. This causes reduction in biological activity as well as toxicity. Alfa toxins can be bound by clay minerals and so also metabolites of plants; heavy metals as well as toxins. The chemistry of clay minerals determines the degree of adsorption. Along with these exchangeable ions, surface properties as well as the fine structure of the clay particles also determine the absorption rate (Vondruskova *et al.*, 2010). Clay after addition in diet binds with toxic substances such as Alfatoxins, plant metabolites and heavy metals etc. Therefore, these substances may be useful in case the feed contain some amount of mycotoxins. Research is going on for exploiting the use of clay mineral (especially silicate minerals) in diet of animals for improving the growth (Safaei *et al.*, 2014)

2.8. Herbs as growth promoters:

Since ancient times aromatic plants/photobiotic have been used because of their preservative as well as medicinal properties along with the characteristic of imparting aroma as well as flavor to food. Utility of plant extracts as perfume fumigations had been done by the father of medicine: Hippocrates. In traditional as well as veterinary medicine for centuries long aromatic plants (also called as herbs and spices), their essential oils as well as extracts from herbs has originated from sources like ethno veterinary medicine or even from folkloric sources (Fallah *et al*., 2013). Natural medicinal products originating from herbs, spices and their

products including essential oils have been used as feed additives in poultry production (Hashemi and Davoodi, 2011; Khan *et al*., 2012a). Compared with antibiotics or inorganic chemicals, these plant-derived products have proven to be natural, less toxic and are thought to be the ideal feed additives in the feed of poultry. Now-a-days, there is an increasing interest in the use of medicinal plants as feed additives in poultry diet to enhance the performance of poultry birds (Khan *et al*., 2010, 2012b).

2.9. Amino acids:

Amino acids are organic compounds which contain at least one amino group (-NH2) and a carboxy (-COOH) group. In the human genome, 20 amino acids are created to build proteins and therefore termed protein gene. Besides this, there are approximately 250 amino acids which do not form proteins. These are used to form sugar for example (Mukhtar et al., 2010).

2 .9.1The effects of amino acid:

Research over recent years has shown that amino acids have been useful against diabetes, osteoporosis, heart trouble, metabolic disorders, erectile dysfunction and anti-aging and also menopausal complaints. That was the message from the international symposium of the Society for Applied Amino Acid Research in Treatment and Practice held in 2005 and attended by one hundred scientists from six different nations. Even though studies showed that the effects of amino acids are positive, they are still not properly recognized in the field of medical science in Europe (**Latshaw,1981)**.

2.9.2Types of amino acids:

2.9.2.1Arginine:

Arginine, or L-arginine as it is called with its L-structure, is a semi-essential amino acid. Arginine is involved in many metabolic processes and important in the treatment of heart diseases and high blood pressure. Arginine improves the

circulation, strengthens the immune system and has a positive influence on male libido.

2.9.2.2:Carnitin:

The naturally-occurring, chemical compound carnitine, or L-carnitine, is technically speaking, not an amino acid. It is actually a dipeptide made from the essential amino acids lysine and methionine. It is therefore often classed as a conditionally essential amino acid.

2.9.2.3.Glutamine:

The amino acids glutamine and glutamic acid are closely related in a chemical sense. The human body is able to produce L-glutamine itself, from L-glutamic acid through the glutamate ammonium ligase. Considering the numerous metabolic processes glutamine is a part of, it is not surprising that it is the amino acid with the highest concentration in blood plasma, musculature and cerebral and spinal fluid.

2.9.2.4Methionine:

When in its natural L-form, methionine is a protein gene amino acid. It is classed as an essential amino acid and cannot be synthesized by the body itself. This means that a sufficient supply of methionine in the diet or as a dietary supplement is of particular importance (**Fritts**,2000)

2.9.2.5.Ornithine:

Ornithine is a non-proteingene amino acid that plays a central role in the urea cycle. Ornithine can be changed to L-arginine through in the production of urea. It assists in detoxification and therefore contributes to liver health.

2.9.2.6. Taurine:

Taurine is a byproduct of the sulphurous amino acids cysteine and methionine.

Contrary to common belief, Taurine is in itself not an amino acid in the scientific

sense, as it does not contain a carboxye group. It is therefore in fact an amino sulphonic acid ,(Lourenço and Camilo ,2002).

2.10.Vitamins:

Are group of organic compounds that poultry only required in small quantities, but they are essential for normal body functions, growth, and reproduction,(Harsh Pandit,2015) deficiency of one or more vitamins can lead to a number of diseases or syndromes.

Vitamins are divided into two categories: fat-soluble and water-soluble. The fat-soluble vitamins are A, D, E, and K. The water-soluble vitamins include vitamin C and the B vitamins.

Poultry can make vitamin C, so there is no dietary requirement established for this vitamin. Vitamin C supplementation is useful when birds are in stress.

Vitamin A is required for normal growth, reproduction and maintenance of epithelial cells in good condition (skin and the linings of the digestive, reproductive, and respiratory tracts). Deficiency causes nutritional group, characterized by conjunctivitis, ocular-nasal discharge, and eyelids stuck together with thick exudates. In advanced cases necrosis and keratisation of mucosa of alimentary and respiratory tract occurs. Fish liver oil and greens are rich sources of vitamin A (Aburto, and Britton, 1998).

Vitamin D3 is required for proper absorption and utilization of calcium and phosphorous, which are required for normal growth, bone development, and eggshell formation. Vitamin D can be produced when sunlight hits the bird's skin. Deficiency leads to rickets. Birds produce thin shelled eggs with reduced hatchability, show leg weakness and penguin like sitting posture. The beak, claws

and ribs become very pliable. Characteristic feature is the bending of sternum and spinal column. Fish liver oils are rich sources of vitamin D, (Atencio, *et al.*, 2004a).

Vitamin E is a powerful antioxidant and important for normal neurological functions. Deficiency leads to encephalomalacia/crazy chick disease, oxidative diathesis in young birds, muscular dystrophy seen more frequently in older and mature birds (Combs, and Scott, 1974).

Vitamin K is essential for synthesis of prothrombin, thus it plays an important role in clotting mechanisms and also has a protective effect against coccidiosis. Deficiency of vitamin K may cause an increase of blood spots in eggs, hemorrhages in the legs and breast and a failure of blood clotting. Wheat germ oil, fish liver oil, alfalfa meal, greens, germinated pulses, soybean oil, grains and fish meals are rich source of Vitamin A, D3, E and K (Abawi, and Sullivan, 1989).

The B vitamins include vitamin thiamin, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folic acid, and cyanocobalamin. The B vitamins are involved in many metabolic functions, including energy metabolism. A vitamin premix is typically used to compensate for the fluctuating levels of vitamins found naturally in food and to assure adequate levels of all vitamins. Thiamine (Vitamin B1) is necessary for proper carbohydrate metabolism. The deficient birds show anorexia, loss of weight, ruffled feathers, dropping of wings and paralysis of muscles. The birds sit on flexed legs and draw back the head in a 'star-gazing' position. It is found in abundance in rice polish, wheat bran and cereal grains. Riboflavin (Vitamin B2) is part of enzyme systems so plays a vital role in metabolism. The deficiency causes diarrhea and “curled toe paralysis” in birds between the first and second week of age.

The affected birds walk upon their hocks with the aid of their wings. In adult birds, decreased egg production, increased embryonic mortality and dead in shell chicks, with dwarfing and clubbing down feathers are seen. Embryo mortality reaches a peak between 18 to 20 days of incubation. Grasses and brewer's yeast are rich source of this vitamin. Pyridoxine (Vitamin B6) is necessary for proper metabolism of amino acids. Due to deficiency, spasmodic convulsions and jerky movements are seen in sick birds. The bird should be fed cereal grains, yeast and alfalfa meal. Cyanocobalamin (Vitamin B12) is involved with nucleic acid synthesis, carbohydrate and fat metabolism and methyl synthesis. This is found in all foods of animal origin. Its deficiency shows slowed growth, poor feed utilization and reduced hatchability. Embryonic mortality reaches peak on the 17th day of incubation. Moytrophy of legs and hemorrhages in the allantoids of the embryo may be seen. Fish meal, milk products and animal proteins are sources of vitamin B12.Choline deficiency: The deficiency of chorine causes perosis, characterized by puffiness around the hock joint, flattening of the tibiometatarsal joint and a twisting and bowing of the metatarsal with a slipping of the Achilles tendon from the condyle. The livers of deficient birds show abnormal fat contents. Yeast, fish meal oil cake and synthetic choline can be given to birds.(Pandit(2015)

2.10.2. Using vitamins to improve poultry production:

It's no secret that vitamins are an important component of any animal feed formulation plan. However, are you certain you're using the right ones to achieve your goals, as with any species, an adequate supply of vitamins and minerals is key for good poultry nutrition, strengthening the bird's defenses against harmful pathogens. Nutrition becomes increasingly important after periods of disease or stress when the immune system is weakened and energy levels are at their lowest.

In fact, nutrition is a crucial factor in preventing, treating or recovering from illness or stress .There are many vitamins required for optimal poultry health. Usage of these nutrients in adequate amounts, as well as some others, can both improve animal health and the producer’s bottom line (Caroline, 2011)

CHAPTER THREE
MATERIALS AND METHODS

CHAPTER THREE
MATERIALS AND METHODS

3.1: Experiment Site:

The experiment was conducted at the Poultry Farm College of Agricultural Studies, Sudan University of Science and Technology, during the period from (15 August _ 19 September 2017) 35 days, during which the ambient temperature ranged between (**35-40^{0}c)**

3.2Housing:

An open system house was used. The pens were cleaned commencement before the experiment .A layer of wood shavings (about3cm thick) was laid on the pen floor as a litter material.

Each pen was supplied with 2.5gallon drinker and 5kg feeder's height was adjusted according to progressive growth of the chick's .over head light were provided24 hours, in a form of natural light during the day and artificial light during night 1-2 bulb lamps to each pen.

3.3. Experimental Chicks:

A total number of 72 chicks, 7day old - unsexed, commercial broiler chicks (Arbor Acres strain) were obtained from a commercial hatchery. The chick's were randomly assigned according to their initial body weights after one week of adaptation period, into three experimental groups as follows: (A, B and C) each treatment group was subdivided into three replicates, 8 chicks per each. The chicks groups were reared under the same environmental condition. Chicks were vaccinated against Marek,s disease on hatchery. On farm they were vaccinated against Gambaro D78 disease (IBD) at 7, 13, 21, and 28 days of age and against New castles disease in drinking water at 7, 21 and 28days (colon30),a soluble multi- vitamin provided to guard against stress. During the experiment, Water and feed were provided *ad libitum* throughout the

experiment .chicks were weighed weekly and feed intake per pen was recorded at the same time. The measured performance parameters includes: final body weight (g), body weight gain (g), feed intake (g), feed conversion ratio, and mortality rate (%) .

3.4. Experiment Diets:

The chicks were fed a commercial broiler per-starter , (100g / chick during the first week) for week. Then a basal diet ,which was formulated to meet the NRC ,(1994) recommendation was provided to the groups of chicks .Ultramin (awater soluble powder for oral administration) ,Supervit(water soluble powder) ,which composite of group of vitamins were added in the drinking water. The birds in the control group (Group C)received the control diet and water (without any supplementation)., Chicks in group A were given the control diet and their drinking water was supplemented with Ultarmin 10 g/16L twice daily(day interval) , Chicks in group B were given the control diet and their drinking water was supplemented with SUPER VIT5g /16 L twice daily (day interval).

The feed ingredients used and the **nutritional composition** of the experimental diets are shown in Table 1. The diets were formulated to meet the recommended nutritional requirements of the Arbor Acre broiler strain used.

Table (1): composition of the experimental control diet:

Ingredients	Sorghum	G.N Cake	Sesame Cake	Conc.*	Oster - Shell	Dical. phos	salt	Lysine	Meth.
%	64.142	14.0	15.0	**5.0**	0.487	0.618	**0.25**	0.344	0.159

*ME= metabolizable energy, CP= crude protein, Meth. = metheione, Ca=calcium Dical .phos. =DiCalcium phosphorus, Conc= concentration, G .N Cake=Ground nut cake

Table 2: Calculated composition of control diet

ME k//cal	CP%	Lysine	Methionine	Ca%	PHs. %	Fiber %
3105.21	22.82	1.5	0.63	1.15	0.76	-

Table 3: Chemical composition of control diet

Moisture%	DM	ASH	CP	EE	CF	NFE	ME
2.75	97.25	3.15	22.45	4.45	3.11	64.2	2.84

3.5. Ultramin:

Ultramin contains the essential amino acids which control protein synthesis. Also Ultramin indicated during stress, and during disease periods of all domestic animals.

Ultramin also increases growth rate and feed conversion rate in boilers and animals ,as increase egg production ,and egg shell thickness in layers , and improves productivity rate in animals.

3.5.1. Dosage and administrations:

Poultry: 1-2g per 1litre of drinking water for5-7 days.

3.5.2. Composition:

Each 1g contains Vit. A 5000 , Vit -D3 1000 UI, Vit .E 2 UI , Vit .c 8 gm , Vit.B1 1gm Vit.B2 1gm , Vit.B6 0.5 gm, Vit.B12 10mcg, Nicotinamide 10mg, Ca-d-pantothenate5mg , methionine 19mg ,lysine HCL 31.243mg ,tryptophan 2.2mg , argentine HCL 7.862mg , Histamine HCL 5.929mg , Threonine 7.7mg , Phenylalanine 8mg , Isoleucine 4.5mg, leucinee 8mg , valine 8.5 mg , Glycine 5.8mg , Aspartic acid 9.6mg , porline 2.05 mg , glutamic acid 10.2mg , Alanine 4.6mg , tyrsine6mg, Serine 3.2mg , biotin 15 mcg Store:

Store in dry place at temperature below 30^0C

3.6. Supervit:

Supervit recommended in case of vitamin deficiencies, CRD and worms after vaccination.

3. 6 .1.Indication:

Supervit is a supplementary source of essential vitamins for poultry and other and increases egg, meat and milk production.

3 .6.2.Dosage: (poultry)

Prevention: 0,25g 1litre of drinking water for 7-10day.

Treatment: 0.5g. 1 litre of drinking water for 7-5day.

3.6.3 Composition:

Each 1gm Contains:

Vitamin A 15000 U .I., Vitamin D3 1500 I.U., VitaminE2gm, Vitamin k3 2gm, Riboflavin (B2) 2.5 mg , Calcium-D-Pantothenate 5,5mg nicotinamide (B3)10mg, Pyridoxine HCI (B6)3m, Thiamine HCI (B1)2mg, Vitamin B12 5mcg folic Acid 2mg

3.6.4. Store:

Store in dry place at temperature below 30^{0C}.

3.6. Parameters:

Birds of each replicate were group weighed at weekly intervals and feed intake was recorded at the time of weighing .Feed conversion ratio (FCR) and boy weight gain were calculated weekly and mortality was recorded daily.

3.7. Carcass preparation:

At the end of the experiment, from each group were weighted individually. Then they were slaughtered. After bleeding, the slaughtered birds were scaled in hot water; feather plucked manually then washed .The head was removed close to the skull. Feet and shanks were removed at the hock joint, and eviscerated; gizzard heart, and liver.

3.8. Calculation:

The hot carcass weights, non carcass components such as head, heart, gizzard, liver.

3.9. Chemical analysis:

separated serum from the collected blood Samples also were analyzed according to Central Veterinary Research Laboratory Soba, plasma was separated and analyses

for total ALK(Alkaline Phosphate), SGPT(serum glutamate private ox acetate octet ,) SGOT(glutamate oxalic acetate trans amines) ,Na ,CauTriglyceride cholesterol ,Uric acid .

3.10. Statistical Analysis:

All the data was statistically analyzed using ANOVA. The differences between the means of each group were separated by Duncan's Multiple Range Test. Statements of statistical significance are based on $p<0.05$.

CHAPTER FOUR
RESULTS

CHAPTER FOUR
RESULTS

The effect of adding ultramin and supervit , into the drinking water, on the production parameters of broiler chicks are summarized in Figure 4 and Table 4.the result revealed no significant (P>0,05) effect on the performance (final body Wight , Wight gain , feed intake and feed conversion rate) of broiler chicks . Both treatment groups showed numerical increase in final body Wight and feed in take compared to control group however, control group showed numerically the best value in Wight gain and feed conversion rate.

Table (4): Effect of Ultramin and Supervit on Performance of Broiler Chicks:

Treatments	Mean±SE			
	Final Body Weight(g)	**Weight Gain(g)**	**Feed intake(g)**	**Feed Conversation Ratio(g\gfeed)**
ULTRAMIN	1575.33[a] ±67.55	1387.67[a] ±69.09	3395.0[a] ±64.08	2.14[a] ±0.06
SUPERVIT	1570.67[a] ±56.05	1401.67[a] ±51.69	3439.33[a] ±60.37	2.17[a] ±0.12
CONTROL	1553.0[a] ±47.15	1413.0[a] ±34.19	3359.67[a] ±18.09	2.07[a] ±0.03
Sig	NS	NS	NS	NS

[a,b,c] Superscripts in a column differ significantly (P<0.05)

NS: Not Significant (P≥0.0

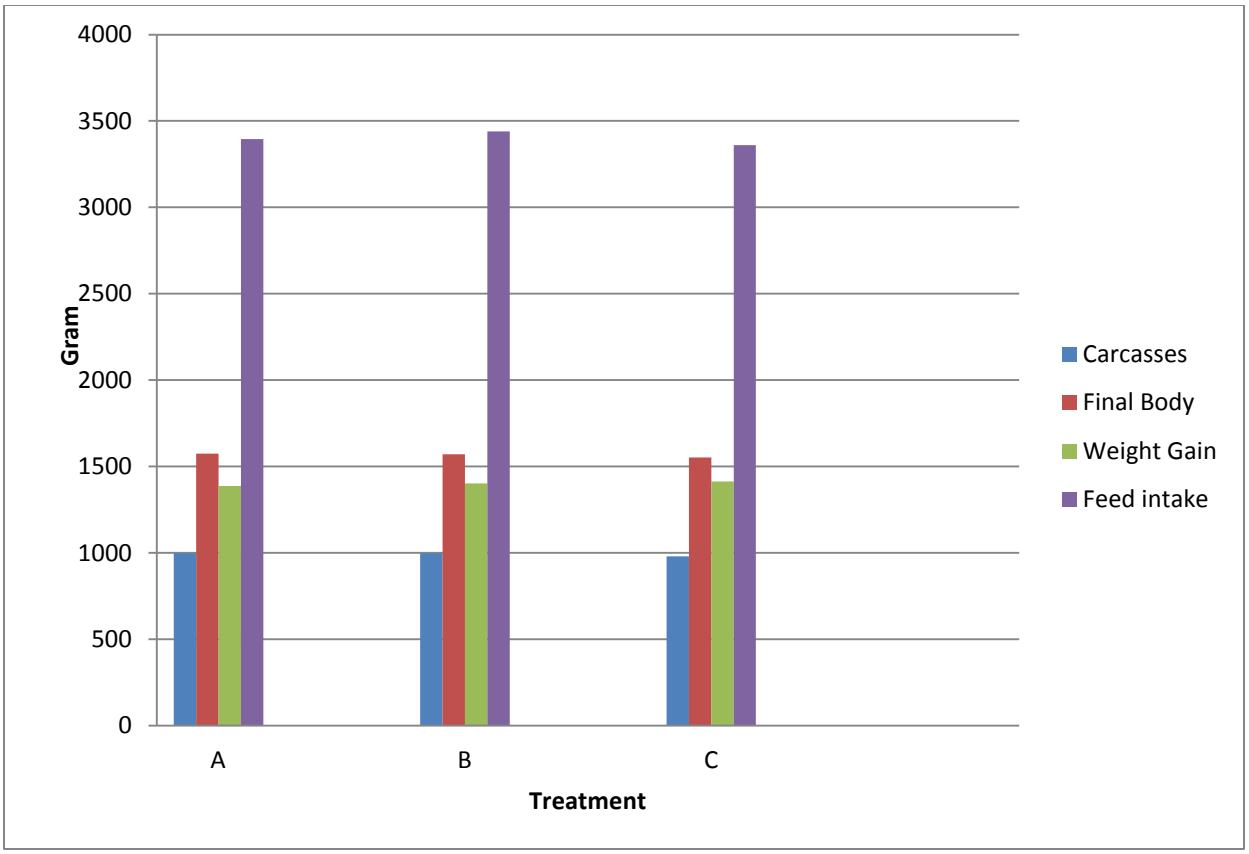

Fig :(1) Effect of Feeding Ultramin and Supervit on Performance of Broiler Chicks

Key:
A≡Ultramin
B≡Supervit
C≡ Control

Result obtained for non carcass components table (5) showed no significant difference (P>0. 05) in the value of heart level. However group on ultramin showed significant increases (p<0.05) in weight of gizzard compared other tasted group.

Table (5): Effect of Ultramin and Supervit on Non -Carcasses Component of Broiler Chicks:

Treatments	Means±SE			
	Carcasses(g)	Heart(g)	Liver(g)	Gizzard(g)
ULTRAMIN	0.998[a] ±0.05	12.33[a] ±0.33	42.0[a] ±2.0	87.33[a] ±0.67
SUPERVIT	0.999[a] ±0.02	13.0[a] ±1.15	44.0[a] ±2.31	64.33[b] ±1.20
CONTROL	0.980[a] ±0.01	14.0[a] ±1.0	48.0[a] ±0.58	65.67[b] ±1.33
Sig	NS	NS	NS	**

[a,b,c] Superscripts in a column differ significantly (P<0.05).

NS: Not Significant (P≥0.05).

**: High Significant (P≤ 0.01).

The effect of ultramin and supervit via drinking water on the enzymes (SGPT and SGOT) of blood serum (table, 6) , showed that chicks group on supervit recorded high significant (P<0,01) in both enzyme compared to other tasted group which were showed no significant difference (p>0,05) between them .

The analysis of blood serum showed level significant (P>0.05) deference in the consenting cholesterol and uric acid (table 7), however, group on supervit recorded significant (P>0.05) different in concentration level triglyceride compared to control group.

The effect of ultramin and supervit in drinking water on the concentration level of blood serum minerals showed that both treatment groups recorded significant ($P<0.05$) high concentration level of calcium compared to control group .

Which there no difference among taste group in the concentration level N(table 8).

Table (6): Effect of Ultramin and Supervit on enzymes in Blood serum

Treatments	Mean±SE		
	Alk(u/l)	SGPT(u/l)	SGOT(u/l)
ULTRAMIN	89.95[a] ±1.16	28.88[b] ± 1.62	74.62[b] ±1.41
SUPERVIT	86.08[a] ±5.97	37.03[a] ±1.56	81.62[ab] ±2.47
CONTROL	89.73[a] ±1.09	28.89[b] ±0.74	77.66[a] ±0.69
Sig	NS	**	*

[ebc] Superscripts in a column differ significantly ($P<0.05$)

NS: Not Significant ($P\geq0.05$).

**: High Significant ($P\leq 0.01$).

*: Significant ($P\leq 0.05$).

Table (7): Effect of Ultramin and Supervit on Serum Physical Characteristics broiler chicks:

Treatments	Mean±SE		
	Triglyceride (mg/dl)	**Cholesterol (mg/dl)**	**Uric Acid (mg/dl)**
ULTRAMIN	1.18^{ab}±1.45	51.46^{a}±2.26	2.13^{a}±0.05
SUPERVIT	1.21^{a}±1.42	55.25^{a}±0.94	2.11^{a}±0.08
CONTROL	1.15^{b}±1.59	53.06^{a}±2.21	2.0^{a}±0.05
Sig	*	NS	NS

^{a,b,c} Superscripts in a column differ significantly (P<0.05)

NS: Not Significant (P≥0.05).

*: Significant (P≤ 0.05)

Table (8): Effect of Ultramin and Supervit on Mineral in Serum broiler chicks:

Treatments	Mean±SE	
	Na	Ca
ULTRAMIN	1.37^{a} ±1.63	8.04^{a} ±0.06
SUPERVIT	1.36^{a} ±1.32	8.10^{a} ±0.82
CONTROL	1.37^{a} ±1.05	5.65^{b} ±1.14
Sig	NS	*

^{a,b,c} Superscripts in a column differ significantly (P<0.05)

NS: Not Significant (P≥0.05).

*****: Significant (P≤ 0.05).

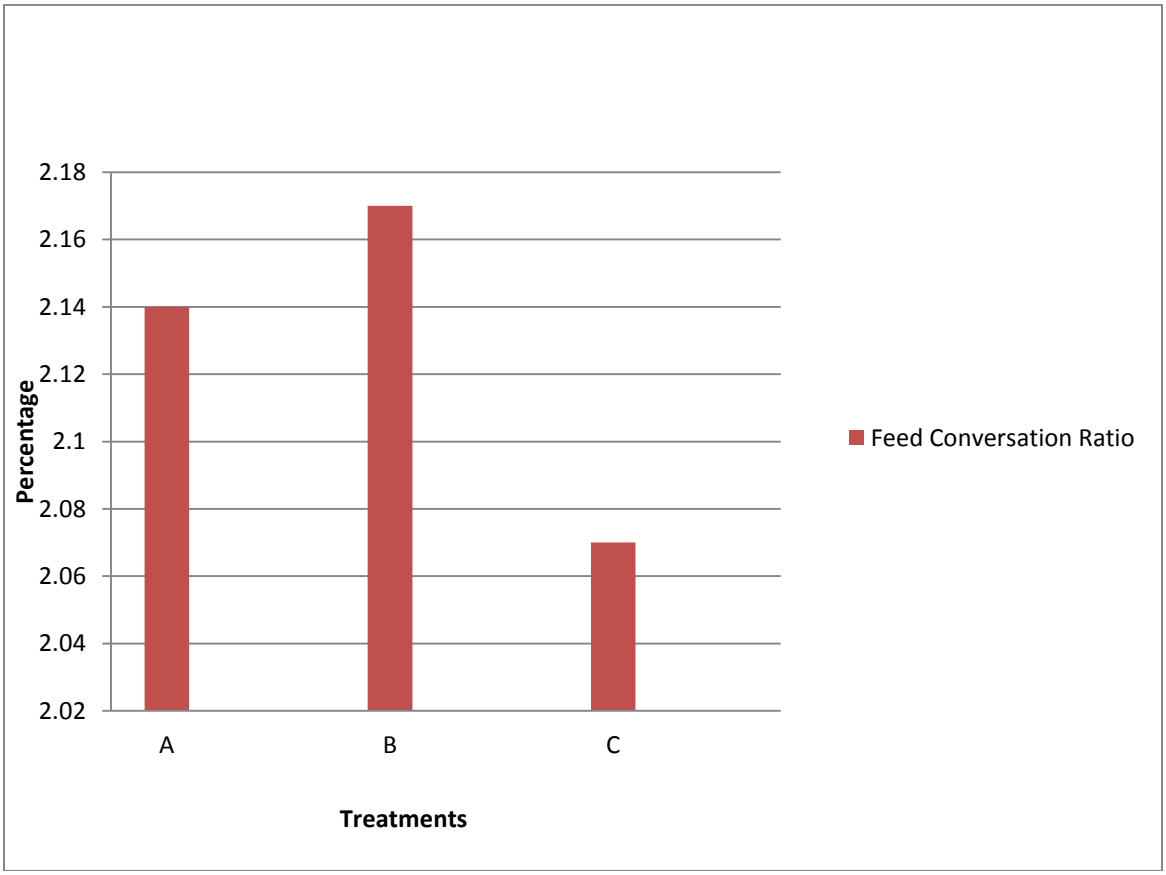

Fig (2) Feed Conversation Ratio

Key:
A≡Ultramin
B≡Supervit
C ≡Control

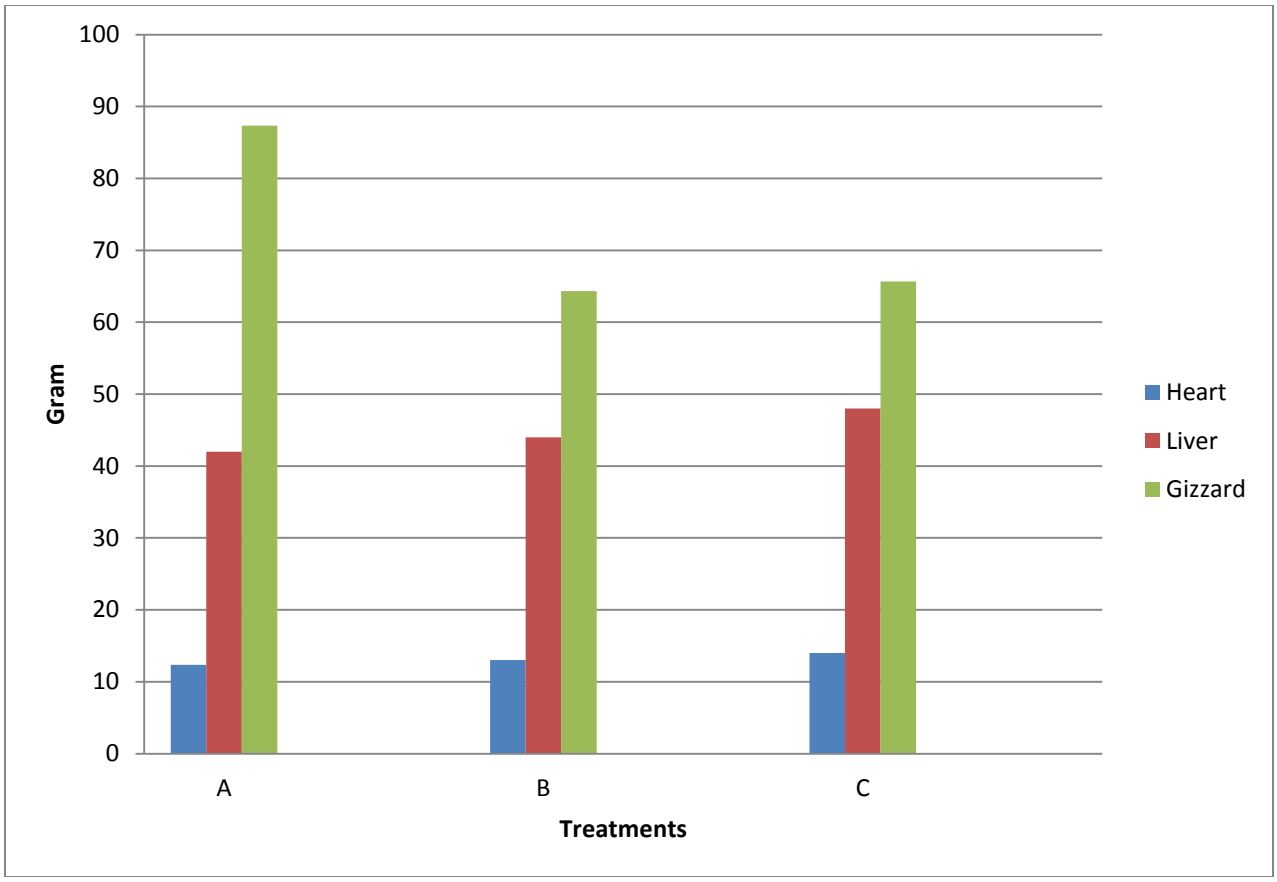

Fig (3) Effect of Feeding Ultramin and Supervit on Non Carcasses Component of Broiler Chicks

Key:
A≡Ultramin
B≡Supervit
C ≡Control

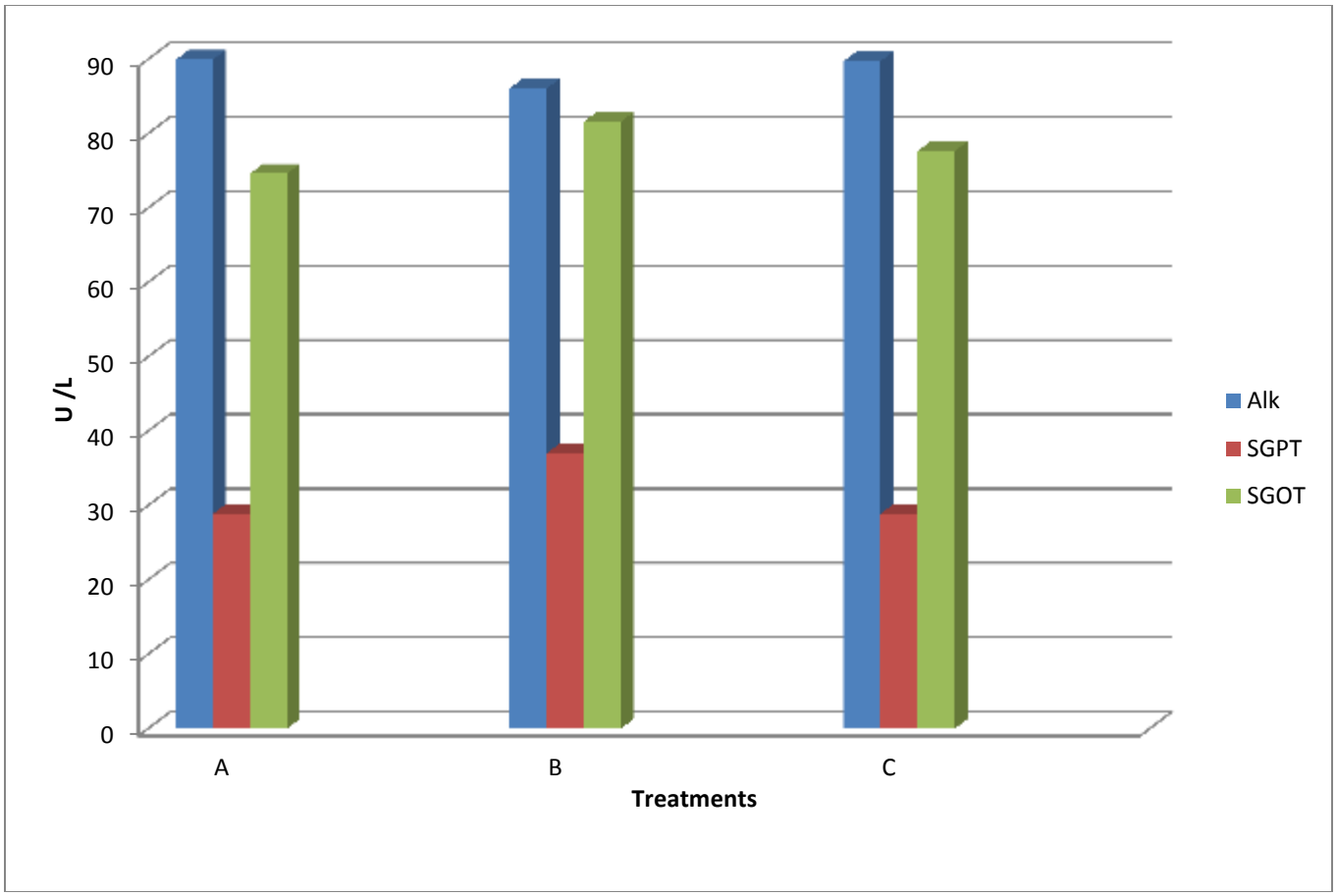

Fig (4) Effect of Ultramin and Supervit on enzymes in Blood Serum

Key:
A ≡Ultramin
B≡Supervit
C ≡Control

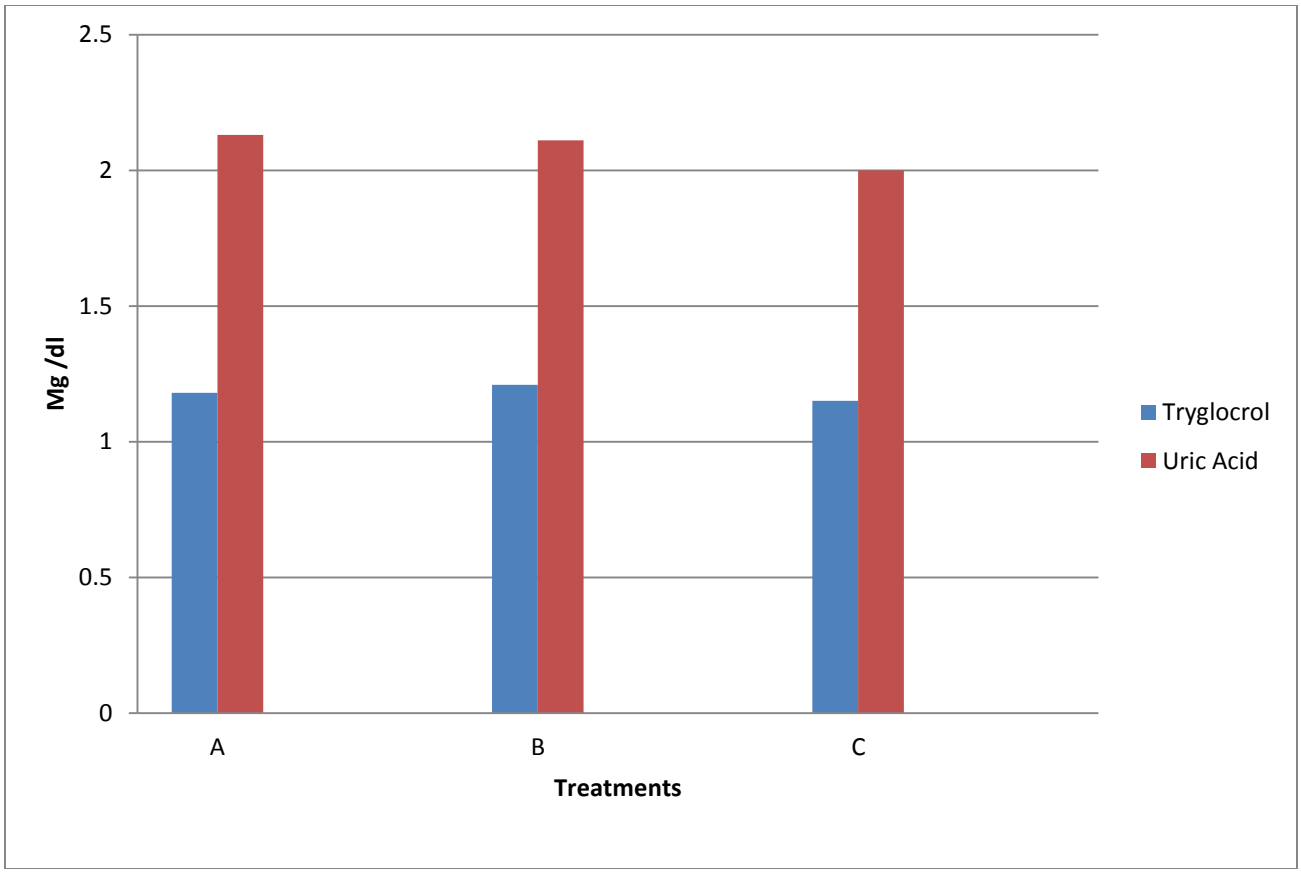

Fig (5): Effect of Ultramin and Supervit on Serum Physical Characteristics broiler chicks:

Key:
A ≡Ultramin
B≡Supervit
C≡ Control

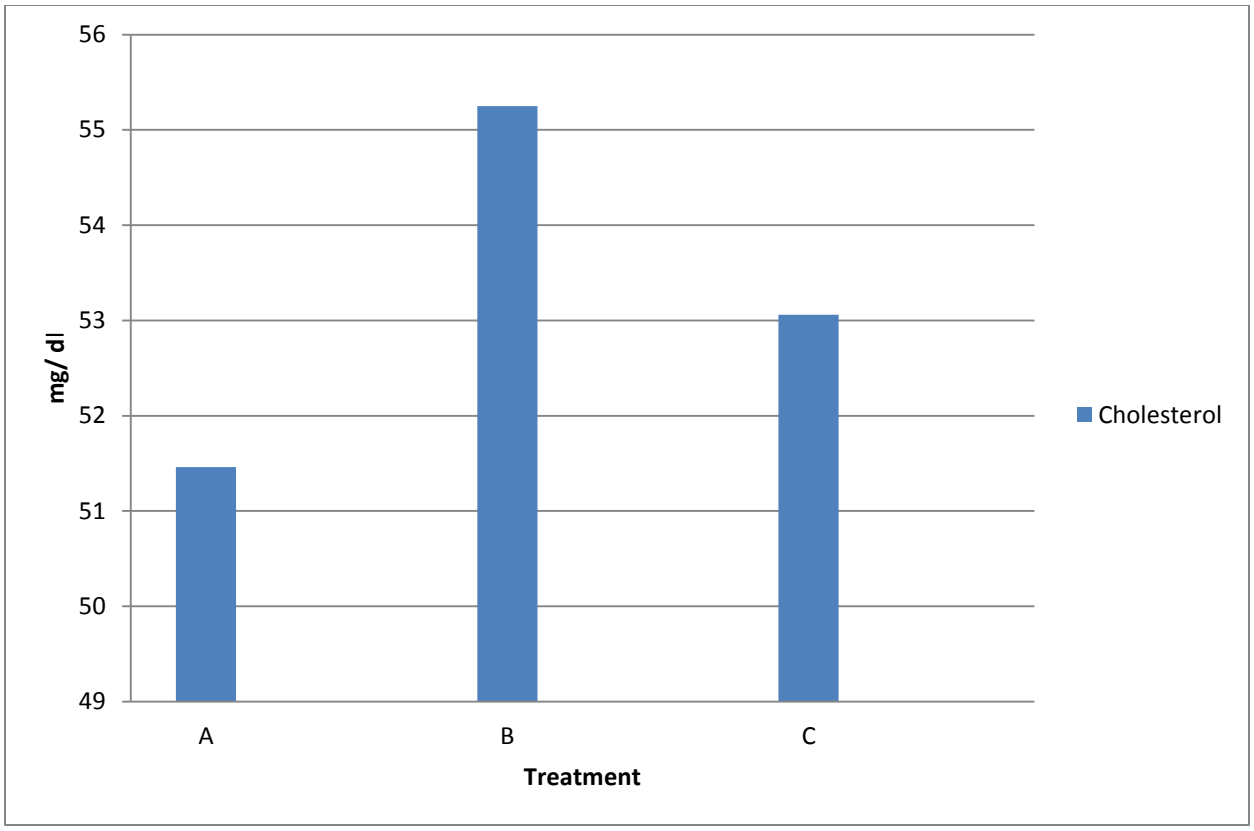

Fig (6): Effect of Ultramin and Supervit on Cholesterol broiler chicks

Key:
A ≡Ultramin
B≡Supervit
C ≡Control

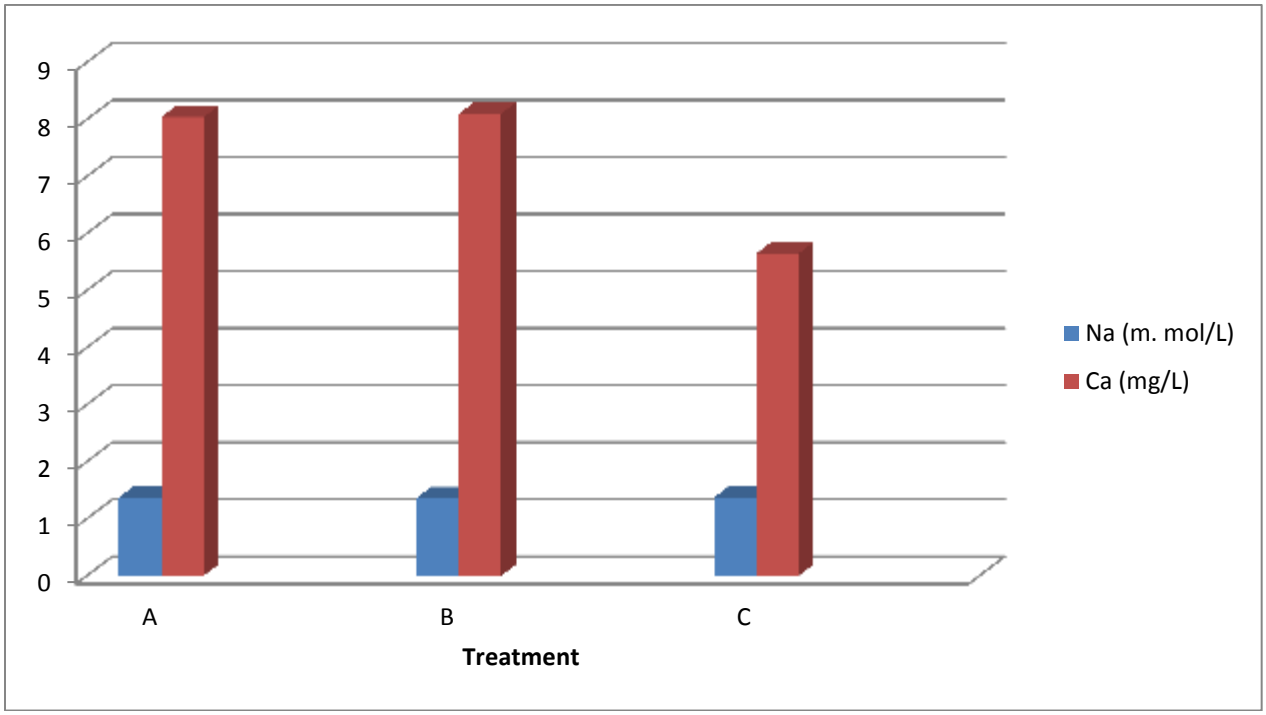

Fig (7): Effect of Ultramin and Supervit on Mineral in Serum broiler chicks

Key:

A ≡Ultramin

B≡Supervit

C ≡Control

CHAPTER FIVE

Discussion

CHAPTER FIVE

Discussion

The experimental chicks showed good health and no mortality was recorded through of the experiment .this may be due to good sanitation and bio-security and the vitamins and stimulate – immunity system and well regulation of micro flora of intestine (Sahin *et al* .,2003).

The inclusion of ultramin an supervit in broiler drinking water did not affect significantly on the preference of the experimental chicks compared to control group .this may be to good environmental condition so that the role of vitamin is yet , or may be due to that recommended dose by the manufacture is not enough under our condition . This result was similar with that obtunded by Hind (2015) and Puron *et al., (*1994) who examined 200 PP m ascorbic acid and 250ppm acetyl salicylic and found no effects on performance and survivability of chicks. MuhitAsli *et al*.,(2007) recorded no effect on egg weigh due to the addition of vitamin E .This study did not agree with that reported by Pathpongsiripom *et al*.,(2001), they added vitamin E and C observed a decrease in feed intake of chicks . This result also did not in line with that recorded by Mohammed *et al*.,(2013) , who added L 47 promoter in the drinking water .

Al-Fadil *et al.*,(2013) found apparently improved in the performance of broiler chicks fed on diets supplemented with gum as natural prebiotic .

Data obtained showed no significant difference in the average percentages of non – carcass components (liver and heart), however, gizzard recoded significant heavy weight for chicks fed on ultrmin in drinking water.

The analysis of blood serum showed that the concentration of alkaline phosphate, cholesterol, uric acid and Na did not significantly influenced by treatments. The inclusion of ultramin in drinking water for broiler chicks had no significant effect on the blood serum parameters (alkaline , cholesterol , uric acid enzymes ,

minerals) , however , supervit increased significantly enzymes levels (SGPT and SGOT) , Triglyceride and Calcium concentrations .These results did not agree with that reported by Rasha , (1996)and Veltmann *et al.,* (1986) who , found an increase in plasma alkaline phosphate in chicks fed on vitamin A . The effect of supervit on enzymes in line with that obtained by Swain and Johri (2001) , and Bangl (2007)who study the effect oral administration of enzymes and vitamins on growth, hematological and biochemical parameters .

Abbaszadeh *et al* ., (2013) and Arsalan *et al(*2001 *)*found that supplementation of vitamin E at different levels affect on the level of triglyceride in group serum .

The result concern uric acid was in line with that recorded by Sahin *et al*. , (2001) and Speranda *et al*.,(2008) who observed no significant effect of vitamin E or Se levels on plasma uric acid of broiler chicks .

The effect of ultramine and supervite in drinking water in this experimental on the serum calcium in line with the finding of (Rasha, 1996; Chertow, 1977 and Abdel Majeed, 1999)

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion:

Based on the results obtained it can be concluded that vitamin Ultramin and Supervit can be included in broiler diets without any adverse reaction. Supplemented of Ultramin and Supervit apparently improved the general performance of broilers chicks.

6.2 Recommendations:

The results of the present study showed that Ultramin and Supervit can be used in drinking water in open system at humidity summer session as heat stress control; other it is better to increase the level of inclusion of Ultramin and Supervit and the method of using.

-This study recommends using of Ultramin and Supervit at different session to reach the best result.

Further study is suggested to determine the effect of dietary vitamin Ultramin ,Supervit and other enzymes on the performance and immune response of broiler chicks

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