SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY
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Study of Different Levels of Yeast on performanceValues and Immune Response in Broiler Chicks

(دراسة استخدام مستويات مختلفة من الخميرة على أداء واستجابة مناعة كتاكيت اللاحم)

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بسم الله الرحمن الرحيم

قال تعالى

وَاللَّهُ خَلَقَ كُلَّ دَابَّةٍ مِنْ مَاءٍ فَمِنْهُمْ مَنْ يَمْشِي عَلَى بَطْنِهِ وَمِنْهُمْ مَنْ يَمْشِي عَلَى رِجْلَيْنِ وَمِنْهُمْ مَنْ يَمْشِي عَلَى أَرْبَعٍ يَخْلُقُ اللَّهُ مَا يَشَاءُ إِنَّ اللَّهَ عَلَى كُلِّ شَيْءٍ قَدِير) سورة النور الاية ٤٥

DETICATION

TO THE GREAT WOMAN IN THE WORLD MY MOTHER

TO MY DEAR ,GENTAL MAN MY FATHER

TO MY HUSBAN, MY TEATCHERS,MY BROTHERS,MY SISTERS,

MY SONS, MY DAUGHTER AND MY RELATIVES

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ABSTRACT

This study was conducted to evaluate the using ofthree levels of dry yeast (0.1,0.2,and 0.3%)respectively , Neomycin and control groups on broiler on performance and immune responses. Hundred and five unsexed day old Aberker strain was an average weight of 43 grams were subjected to 43-days experimental period. The chicks were distributed randomly into (5)groups with(3) replicates each 7chicks per replicates .Treatments groups (A)represent control,(B) Neomycin and C,E,Dcontaining 0.1%,0.2% and 0.3% dry yeast (sacchromycescereviase) respectively. Result showed thatchicksfed 0.3% dry yeast(s.c) had higher significantly ($p<0.05$) body weight gain(BWG) at end of experiment and best feed conversion ratio (FCR) (1.8). There is no significant differences in feed intake (FI) among all treatments .Chicks fed 0.3% yeast compared to- Neomycin ,0.1% and 0.2%(s.c) groups had a lower abdominal fat and high carcass yield . Belong immune response chicks were fed yeast (0.1%,0.2%,0.3%) showed no significant difference among treatments groups after using of (IBD-D78) vaccine regarding antibodies titer of vaccination but when used yeast 0.3%there is a high antibodies titer different between the treatments neomycin and control group When applied (0.1% 0.2% and 0.3%)yeast respectively had high antibodies titer of vaccine NDV in both readings (18days -43days of age) of vaccination programme .In conclusion in this study regarding to the results obtained indicated that supplementary yeast 0.3% could improve performance values in body weight gain ,feed conversion ratio and highly rate of carcass dressing. In

immune response chicks at 18days where recorded highly titer antibodies in group treated by 0.3% yeast .

الملخص

اجريت هذة التجربة لدراسة اثر تغذية الدجاج اللاحم على علائق تحتوى على مستويات مختلفة من الخميرة (Sacchromycescerveisia)كمحفز للنمو بديلا للمضادات الحيوية على الاداء الانتاجى واثرها على المناعة.

تم استخدام النظام العشوائى الكامل **CRD**فهذة التجربة ،حيث استخدم عدد ١٠٥كتكوت لاحم من سلالة**Aberker strain**فى عمر ٥ايام غير مجنسة ،قسمت عشوائيا الى ٥ مجموعات تجريبية متساويةتقريبافى الوزن الابتدائى و كل مجموعة بها ٣ مكررات و بكل مكرر ٧كتاكيت ، تمت تغذية المجموعة الاولى **A**على عليقة اساسية بدون اىإضافة (عليقة قياسية) وتمت اضافة المضاد الحيوى (نيوماسين) للعليقة القياسية لتغذية المجموعة الثانية ، اما المجموعات الاخرى **E,D,C** فقد تغذيتها على العليقة الاساسية مضافا اليها الخميرة الحية (**Sc**) بالمستويات:- **0.1%،0.2%** و **0.3%**على التوالى.

تم تكوين العليقة الأساسية وفقا للاحتياجات الغذائية للدجاج اللاحم طبقا لعليقه قسم الإنتاجالحيواني ،كلية الدراسات الزراعية جامعة السودان للعلوم والتكنولوجيا . تمت التغذية على العليقة التجريبية لمدة ٥ أسابيع ،تمت المراقبة اللصيقة لصحة القطيع وتسجيل قياسات الأداءالانتاجى :الوزن المكتسب و العليقة المستهلكة ومعدل التحويل الغذائي كما تم حساب نسبة التصافي للذبيحة بالإضافة للتقييم الاقتصادي بنهاية التجربة .

اثبتت النتائج المتحصل عليها ان مجموعات الكتاكيت المغذاة على العلائق المضاف اليها الخميرة الحية (**Sc**) كانت أفضل معنويا(**P <0.5**)في الجسم المكتسب ومعدل التحويل الغذائي من المجموعات التي غذيت على العليقة القياسية المضاف

إليها المضاد الحيوي (نيومايسين)، بينما لم يتأثر استهلاك العليقة ونسبة التصافي للذبيحة معنويا(**P>0.05**) بالمعاملات الغذائية المختلفة .كما أظهرت النتائج أن مجموعات الكتاكيت المغذاة على عليقه تحتوى **0.3%** خميرة حية (**Sc**) هيالأعلى من حيث الوزن المكتسب ومن حيث الربحية في التقييم الاقتصادي من بين المجموعات التجريبية.

كمااظهرت النتائج عدم وجود فروقات معنوية فى الاجسام المضادة فى المجموعات المغذاة على العلائق المضاف اليها الخميرة الحية بعداسبوع من اعطاء فاكسين القمبورو (عمر ١٨يوم) و لكن اشارت النتائج ان المجموعة المغذاة على عليقة مضاف اليها **0.3%** خميرة حية أعطت اجسام مضادة اعلى مقارنة بالمجموعات المغذاة على على علائق مضاف اليها النيومايسين والعليقة الاساسية كما لاتوجد فروقات معنوية لمجموعات الخميرة بعد اسبوع من اعطاء فاكسين النيوكسل وبعد اخذ العينات فى(عمر ٤٣ يوم) ولكن المجموعة التى غذيت باضافة**0.3%** خميرة كانت اعلى عند القراءة الاولى والثانية مقارنة بمجموعة النيومايسين والعليقة القياسية

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 concentrates (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 cost of poultry production because of that the development of poultry industry depends upon the large extent on the availability of feedstuffs that are used or can be made suitable for use in poultry nutrition(Babiker*et al* ,2009). Some of the 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 made by researchers. Some food additives to improve growth performance, reduction of specific nutrient concentration or manipulation of nutrient utilization such as trace mineral nutrition to reduce food cost and nutrient excretion.Public health safety is a major global concern relative to animal production. Therefore, animal production systems need to focus not only on increasing productivity, but also on the impacts of production on the environment and both on animal and human health (Ferket, 2003).

Feed antibiotics used as growth promoters allow better performance (Dibner and Richards, 2005). However, the possible relationship between in-feed antimicrobials and the increase of bacterial resistance in animals

and humans to antibiotics resulted in the adoption of new measures to control this type of chemical compound (Ferket, 2003; Jin, 1997).

Good performance results in broiler homeostasis are directly depend on the immune system. An efficient immune response requires the presence of immune-modulating nutrients in the diet (Qureshi, 2003). These nutrients reduce the immune stress, preventing the mobilization of nutrients to activities that are not related to animal production, thereby, preventing any performance damage (Ferket, 2003). SaccharomyasCercerisiae (Sc), which is one of the most widely commercialized type of yeast, has long been fed to animal. Results of previous studies with yeast fed to chickens however have not been consistent. It has been reiterated (Bonomi and Vassia, 1978; Ignacio, 1995; Onifade*et al.,* 1998) that feeding yeast to chicks improves body weight (BW) gain and feed conversion ratio. On the other hand, Madriqal*et al.,* (1993) failed to observe a positive result of feeding yeast on BW on broiler chicks. Kanat and Calialar, (1996) reported that active dry yeast effectively increases BW gains without affecting feed conversion ratio. Contrast supplementation of yeast to broiler diets improves feed/gain ratio but not growth rates (Onifade*et al.,* 1999). Recently it has been reported that yeast could be an alternative to antibiotic based drugs in feeding broiler chicks (Hooge*et al.,* 2003) or on recycled litter (Stanley *et al.,* 2004). It well documented that antibiotic have beneficial effect on animal growth performance and health. However, increasing concerns regarding over-use of antibiotics has promoted extensive investigations into alternative to use the Sub-therapeutic antibiotics in production yeast (Gao*et al.,* 2008). The antibiotic in continued use tends to stimulate development of resistance

from harmful microorganism. There is currently an outcry from the consumer society and health sector to ban their use as feed additives in animal and poultry feeds (Cavazzoni*et al.,* 1998). Over the last several years considerable attention has been given to use of probiotics. Mostinterests have been generated because of increased public awareness and objection to use antibiotic as growth promoter (Al-Homidan and Fahmy, 2007). The mode of action of yeast products is yet needed to be clarified. Some studies have confirmed the effect of yeast culture (YC) in increasing concentrations of commercial microbes or suppressing pathogenic bacteria (Stanley *et al.,* 2004).

The Objectives of this study:

-To evaluate the effect of supplementing different levels of dietary dry yeast as a natural feed additive; 0.1,0.2,0.3% in comparison with antibiotic and control group (un treated) on the growth performance (body weight , feed conversion ratio, feed intake and mortality rate).

-Blood samples to evaluate antibodies titer for immune response.

-Economical effect of using dry yeast in broiler diets as natural feed additives.

CHAPTER TWO

LITERATURE REVIEW

2.1.Defining a Feed Additive

The diet of animals and humans contain a wide variety of additives. However, in poultry diets these additives are primarily included to improve the efficiency of the bird's growth and/or laying capacity, prevent disease and improve feed utilization. Any additives used in feed must be approved for use and then used as directed with respect to inclusion levels and duration of feeding. They are also specific for the type and age of birds being fed. These guidelines are maintained by a government committee (Product Safety and Integrity; Australian Government Department of Agriculture, Fisheries and Forestry),Most additives are used to improve physical dietcharacteristics, feed acceptability or bird health (Leeson*et al*., 2008).

2.1.1.Feed Additives:-

Today's intensive animal agriculture industry must adapt to producing animal in a world without antibiotic growth promoters in response to consumer demands. Also, assure that all products of livestock and poultry are Hazard Analysis and Critical Control Point [HACCP] certified. So, there is a tendency to use herbs and probiotics as natural feed additives to avoid the residual cumulative effect for either antibiotics or sysnthetic drugs in final products of poultry, which has a negative effect on the human health [Ragab 2012].

Common feed additives used in poultry diets include antimicrobials, antioxidants, emulsifiers, binders, pH control agents and enzymes and Antibiotic feed additives as growth and health promoters supplemented to

poultry diets to stabilize the gut microflora improve performance and prevent some specific intestinal diseases (Truscott and Al-Sheikhly, 1997; Miles *et al.* 1984; Waldroup*et al.* 1995; Hashemi and Davoodi,(2011) , Griggs and Jacob,(2005). Numerous studies demonstrated that a great number of medical and aromatic herbs, as well as fruits and leaves of some berry plants biosynthesize phytochemicals possessing antioxidant activity and may be used as a natural source of free radical scavenging compounds(Sacchetti et al., 2005 and Yu et al., 2005).

2.1.2.Strategic 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 investments 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, prebiotics, symbiotics, enzymes, toxin binders, organic acids, organic minerals, oligosaccharides and other feed additives has started in the last decade (Griggs and Jacob, 2005Fulton *et al.* 2002;; Owens *et al.* 2008). (Abdulla *et al*., 2011; Cowan, 1999), (Sarker*et al*., 2010)

2.2.Antibiotics:

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

2.2.1.History of the Use of Antibiotics:-

The ready availability of antibiotics in the 1950s resulted in their widespread use as therapeutic agents and growth stimulants for farm animals. Antibiotics have been added to poultry and pig diets to maintain health and production efficiency in the last few decades (Rosen, 1995).

Antibiotic growth promotion in agricultural animal United States and other countries. Early indications of a beneficial effect on production efficiency in poultry and swine were reported by (Moore et al. 1946) and Juke s et al. (1950). One of the first reports of resistance in food animals was made by Starr and Reynolds (1951) after experimental feeding of streptomycin in turkeys. Other researchers (Barnes, 1958; Elliott and Barnes, 1959) have reported an association of resistance to tetracycline when growth-promoting levels of antibiotic are fed to chickens Early concerns about the development of antibiotic resistance in human pathogens and recommendations to ban subtherapeutic use in animal feeds were discussed by Swann in a report to the British Parliament (1969). Indeed, are transmitted from animal to human microbiota (Greko, 2001). Monitoring and identifying resistance mechanisms and their dissemination into the food chain were recently reviewed by Roe and Pillai (2003). Pathogenic bacteria resistant to a number of antimicrobial agents emerged worldwide in the 1980s (Aarestrup, 2003).

2.2.2.The Use of Antibiotics

Antibiotics have long been used as a feed additive to increase broiler's growth performance and control of disease (Chen *et al*., 2009). The use of antibiotics, including chlortetracycline as growth promoters to increase production performance and to decrease mortality, was recommended to be banned by European Union (Perreten, 2003).

Since that time there has been growing concern that the use of antibiotics as growth promoters was resulting in the development of resistant populations of bacteria which made subsequent use of antibiotics for therapy difficult(Mmereole, 2010; Sarker*et al*., 2010).. Their use as animal feed supplements was curtailed by the Swann Committee in 1969, whose recommendations resulted in the restriction of growth-promoting antibiotics to those which were not used in the treatment of disease.

Since then 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 agents 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 animals and the concern about the side-effects of their use as therapeutic agents has produced a climate in which both consumer and manufacturer are looking for alternatives. Bedford (2000) pointed out that the growth-promoting effects of antibiotics in animal diets are clearly related to the gut microflora because they exert no benefits on the performance of germ-free (GF) animals

2.2.3.Comparison Between Antibiotics and Probiotics

In view of the severe restriction or total ban on the use of antibiotics as growth promoters in poultry production, probiotics have been suggested as an alternative to antibiotics. The gastrointestinal tract in chicks is sterile at hatching, and immediately bacteria from the environment or the

diet colonize it. After this first colonization, new bacterial species have more difficulties to establish themselves. Awiderange of dietary factors affect the composition of the microflora. This leads to new micro-ecological conditions that allow a better colonization of some species due to improved adhesion or growth rate. Ingested bacterial species could colonize the gastrointestinal tract, and this is the case when probiotic micro-organisms are administered to the chickens (Fuller, 1989). Using probiotic microorganisms shorten the period needed to stabilize the microflora. This microflora regulation may serve to improve feed conversion, weight gain and also improve the intestinal health and immune competence of the chickens (Panda *etal*., 2000). However, results under field conditions have generally been under field conditions have generally been trials conducted with broiler fed various trials conducted with broiler fed various probiotics were inconsistent. Some researchers reported positive responses of weight gain and feed conversion ratio in chickens due to consumption of probiotics (Kumprecht and Zobac, 1998; Frittsetal., 2000), while others reported no beneficial effects (Panda et al., 1999; Kahramanetal., 2000). The most common routes of administrating probiotic preparations are in feed and drinking water (Tortuero, 1973; Watkins and Kratzer, 1984).

Antibiotics and probiotic are substances produced by some species of bacteria and fungi that have the ability to kill or inhibit the growth of bacteria, or microorganisms are minute her ability to counter the growth of other microorganisms, most notably the microbes that cause avian diseases and antibiotics three uses: therapeutic, preventive, additive a feed. Antibiotics continue to be used in the poultry industry as growth stimulants and therapeutic agents. However, due to the fact that continued

use of tends to stimulate development of resistance from harmful micro-organisms, there is currently an outcry from the consumer society and health sector to band their use as feed additives in animal and poultry feeds.

2.2.4.Negative Impact for Antibiotics:-

Antibiotic use in animals, however, is a potential problem for human medicine because antibiotic resistant bacteria can pass through the food chain to people. As a 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 contaminations of meat products with antibiotics residues (Engberg*et al*., 2000; Apajalahti*et al*., 2004).

This because increases in microbial resistance to antibiotics and residues in chicken meat products can be harmful to consumers. 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 as effective and safe alternatives to AGPs (Fuller, 1989).

2.3. History Background of Probiotic :-

The concepts of probiotics have their inception in the works of IlyaMechnikov (also known as Elie Metchnikoff; 1845–1916). In

addition to Mechnikov being awarded the Nobel Prize in 1908 for his work on phagocytosis, he may be considered the father of modern probiotics (Fuller, 1992). His studies regarding probiotics were based on the observations of Stamen Grigorov (1878–1945), a Bulgarian microbiologist, who documented the health benefits of Bulgarian yogurt as Lactobacillus bulgaricus,today known as Lactobacillus promoted the idea that yogurt and its bacterial constituents were essential ingredients contributing to the longevity seen in Bulgarian peasants. However, the production, consumption, and noted health qualities of yogurt were also well known to the peoples of the Middle East and Asia and predate these more modern observations by perhaps 5,000 yr. One influential episode highlighting its therapeutic use relates how Suleiman the Magnificent (1494–1566) sent a physician from his Turkish court to prescribe yogurt and successfully treat the severe diarrhea suffered by Francis I of France (1494–1547). Guarner*etal*. 2005) attributes the origin of the term "probiotika" to Werner Kollath who, as related by Vergin (1954), proposed the term to designate "active substances that are essential for a healthy development of life.

2.3.1. Definition of Probiotics

Probiotics are defined as live microbial supplements which beneficially affect the host animal by improving some beneficial functions in its intestinal microbial balance (Fuller, 1989)agree with(Salminen*etal*., 1998). Over the years the word probiotic has been used in several different ways. It was originally used to describe substances produced by one protozoan which stimulated another (Lilly and Stillwell 1965) but was later used to describe animal feed supplements which had a beneficial effect on the host animal by affecting its gut flora (Parker

1974). In its latter role it was defined as 'organisms and substances which contribute to intestinal microbial balance'. This definition is unsatisfactory because it is too imprecise; it would include antibiotics. **I** have revised the definition to read **'A** live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance'. This revised definition emphasizes the importance of **live** cells as an essential component of an effective probiotic and removes the confusion created by the use of the word 'substances'.

2.3.2.Probiotics from the Greek :-

The Greek meaning of the word probiotic is for life . Which are viable live microorganisms when administered in adequate amounts confer a health benefit on the host (Fuller, 1989). Several lactococci, lactobacilli and bifidobacteria

are held to be health benefiting bacteria but little is known about the probiotic mechanism of gut microbiota (Gibson and Fuller, 2000). Lactic acid bacteria or LAB constitute an integral part of the healthy gastrointestinal microceology and are involved in the host metabolism(Fernandes*et al.*, 1987).

2.3.3.The Use of Probiotics:-

Today, probiotics are used as health supplements in food and feeds and they are replacing the use of antibiotic growth promoters or chemical supplements. Under the right conditions the claims made for probiotic preparations can be realized. In recent years, antibiotics have not been a major player in most poultry company programs. The use of antibiotics, including chlortetracycline as growth promoters to increase production performance and to decrease mortality, This because increases in

microbial resistance to antibiotics and residues in chicken meat products can be harmful to consumers. The control of infections and enhancement of live performance through a non-antibiotic approach is thus urgently required .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 as effective and safe alternatives to AGPs. At present, there is a large number of NGPs available in the market, including probiotics, prebiotics and immune modulators. They have been used in poultry management to enhance production performances (Mohan *et al*., 1996; Yeo and Kim, 1997; Jin*et al*., 1998), to develop and stimulate the immune response and to reduce mortality .The use of probiotics has become widely accepted as a natural means to promote health for both humans and animals. The health promoting effect of probiotic in the gastrointestinal tract has been mainly associated with their capacity to stimulate the immune response and to inhibit the growth of pathogenic bacteria (Barnes *et al*., 1972).Substitution of conventional and prohibited AGPs with probiotics has received much attention in the recent years. One of the major reasons for increased interest in the use of probiotics is because they are natural alternatives to antibiotics for growth promotion in poultry.

2.3.4. Composition of Probiotics and Samples of Types of Probiotics:-

Probiotics can be presented to the animal in various ways. The type of preparation will depend on the sort of use intended. They can either be included in the pellet feed or produced in the form of capsules, paste, powder or granules which can be used for dosing animals directly or through their food. The target species are cattle, sheep, goats, poultry,

horses and domestic pets. Nearly all of the probiotics currently on the market contain lactobacilli and/or streptococci; a few contain bifidobacteria. Probiotic preparations may consist of single strains or may contain any number up to eight strains. The attraction of multiple-strain preparations is that they are active against a wider range of conditions and in a wider range of animal species .The species currently being used in probiotic preparations are ***L.*** bulgaricus, L. acidophilus, L. casei,L. helveticus, L. lactis, L. salivarius, L. plantarum, Streptococcus thermophilus, Enterococcus faecium,Ent.faecalis, BiJidobacterium spp. The two exceptions, L. bulgaricus and Strep.thermophilus,are yoghurt starter The choice of the other lactobacilli and streptococci may also have been influenced by the yoghurt health claims. Similarly in human flora rats reduced coliform counts were obtained by feeding either acidified milk or pasteurized yoghurt (R. Fuller and C.B. Cole, unpublished data). However, the increased lactase activity of the gut, after ingestion of yoghurt, is dependent on microbial enzyme activity and requires the presence of live yoghurt organisms in the intestine (Garvie*etal*. 1984). However, the situation is complicated by the finding that some of the strains of so-called Ent.faecium used as probiotics are not Ent. faecium but an unidentified strain of Enterococcus (J. Farrow, personal communication) and the strain which causes growth depression is not Ent. faecium but a new species called Ent. hirae (Farrow and Collins 1985). It may be that the two similar organisms are Some probiotics contain Bacillus subtitles as one of the components. However, it is difficult to see how this can be active in the gut; it is certainly not an intestinal organism and, since it **is** a strict aerobe, would not be able to grow or metabolize in the gut.

2.3.5. Probiotics - Properties:

Probiotics have been suggested to have the following properties and functions:-

Adherence to host epithelial tissue, acid resistance and bile tolerance, elimination of pathogens or reduction in pathogenic adherence, production of acids, hydrogen peroxide and bacteriocins antagonistic to pathogen growth, safety, non pathogenic and non carcinogenic, and Improvement of intestinal microflora (Kaur*et al*., 2002). However, the mode of action of probiotics still remains unclear. It has been proposed that probiotics could maintain the healthy intestinal microbiota through competitive exclusion and antagonistic action against pathogenic bacteria in the animal intestine

(Fuller, 1989). The ability of lactic acid bacteria to inhibit the growth of various Gram- positive or Gram- negative bacteria is well known. This inhibition may be due to the production of organic acids such as lactic and acetic acid (Gilliland and Speck, 1977), hydrogen peroxide, bacteriocins, bacteriocin like substances and possibly biosurfactants, which are active against certain pathogens. On the other hand, several studies have suggested that adhesive probiotic bacteria could prevent

the attachment of pathogens and stimulate their removal from the infected intestinal tract. These antagonistic properties could be very useful in probiotic products. Apart from this, successful probiotic bacteria should be able to survive gastric conditions and colonize the intestine, at least temporarily, by adhering to the intestinal epithelium (Lee and et al 1995). Such probiotic microorganisms appear to be promising candidates for the treatment of intestinal disorders produced by abnormal gut microflora and altered gut mucosal barrier functions (Salminen*et al.,* 1996, 1998). LAB

has been found to control intestinal disorders partially due toserum antibodies IgG, and secretory IgA and IgM enhancing immune response (Perdigon*et al*., 2001, Cross, 2002),. Certain strains of LAB can intermittently Trans locate across the intestinal mucosa without causing infection, thus influencing systemic immune events (Cross, 2002, Fuller,1989, Nahanshon .et al, 1992, ,1993, Jin et al 1997 Anndon 2006 , Awad and Ghareeb, 2010).

2.3.6.Effect of probiotics on immune of broilers chicks:-

Activity of the gut microflora, it can have either positive or negative effects on the health and growth of birds. For example, when pathogens attach to the mucosa, gut integrity and function are severely affected (Droleskey*etal*., 1994) and immune system threatened (Neish, 2002). Chicks grown in a pathogen-free environment grow 15% faster than those grown under conventional conditions where they are exposed to bacteria and viruses (Klasing, 1987). Furthermore, it is generally agreed that gut microflora is a nutritional "burden" in fast-growing broiler chickens (Dibner and Richards, 2005; Lan*etal*., 2005) since an active microflora component may have an increased energy requirement for maintenance and a reduced efficiency of nutrient utilization. The focus of alternative strategies has been to prevent proliferation of pathogenic bacteria and modulation of indigenous bacteria so that the health, immune status and performance are improved (Ravindran, 2006). In this review, we will evaluate dietary modulation of gut microflora through the use of fiber-degrading enzymes, probiotics, prebiotics, phytobiotics, as well as their mechanisms of action and effectiveness inpromoting growth in broiler chickens.

2.4.Prebiotics

Prebiotics can be defined as a non digestible food ingredient which beneficially affects the host by selectively stimulating the growth and/or activity of colon and thus improving host health . The concept of prebiotics came to light during mid nineties of the twentieth century (Gibson *et al.,* 1995). Prebiotics pass through the digestive system without being broken down by the digestive being broken down by the digestive intact form. Once these non-digestible carbohydrates pass into the intestines, they carbohydrates pass into the intestines, they that live there. Prebiotics of proven efficacy are able to modulate the gut microbiota by stimulating indigenous beneficial flora while inhibiting the growth of pathogenic bacteria there in(Spring *etal*, 2000,Torres-Rodriguz*etal*, 2007). Many studies support the role of probiotics as effectives alternative to use of antibiotics growth promoters in poultry nutrition ,(Ghadban 2002 ;Patterson and Burkholders ,2003). More recently ,beneficial effects of probiotics on broiler performance(Kabir et al ,2004;Mountzouris et al,2007 ; Vecent*etal* 2007 Apata,2008 , Awad ,Ghreeb, 2010 and Mustafa ,2012)

2.5.Origin of Name of Yeast

The word" yeast" comes from Old English *gist*, *gyst*, and from the Indo-European root *yes* meaning "boil", "foam", or "bubble"'. Yeast microbes are probably one of the earliest domesticated organisms. Archaeologists digging in Egyptian ruins found early grinding stones and baking chambers for yeast-raised bread, as well as Loureiro V, Malfeito-Ferreira M , 2003) a wings of 4,000-year-old bakeries and breweries (Fleet *et al*2001)In1680,Dutch naturalist Anton van Leeuwenhoekfirstmicroscopically observed yeast, but at the time did not

consider them to be living organisms, but rather globular structures, (LoureiroV, Malfeito-Ferr(2003) In 1857, French microbiologistLouis Pasteurproved in the paper "*Mémoiresur la fermentation alcoolique*" that alcoholic fermentation was conducted by living yeasts and not by a chemical catalyst.(Fleet GH, 2001, Oswal , 2002) Pasteur showed that by bubbling oxygen into the yeast broth, cell growth could be increased, but fermentation was inhibited – an observation later called the "Pasteur effect".

2.5.1.Define of Yeast

Yeasts are eukaryotic microorganisms classifiedin thekingdomFungi, with 1,500 species currentlydescribed(Kurtzman , 2006). Yeasts are unicellular, although some species with yeast forms may become multi cellular through the formation of strings of connected budding cells known as pseudohyphae, or false hyphae, as seen in most molds Walker K, Skelton H, Smith K 2002.Yeast size can very greatly depending on the species, typically measuring 3–4 µm in diameter, although some yeasts can reach over 40 µm, (Legras*et al* 2007).Most yeasts reproduce asexually by mitosis, and many do so by an asymmetric division process called budding.

2.5.2.Benefit of the Yeast:-

Yeast, which is known as "Baker Yeast" is rich in crude protein (40-45%) and vitamin B complex. Yeast extracts have been widely reported as successful growth promoter in poultry industry (SavageandZarrewska,1996 and Spring, 2002). Containing minerals and amino acids, yeast offers many benefits. These indispensable elements for a healthy organism give yeast a crucial role in our diet and balance. For example, yeast and its derivatives are used in food supplements to

complement our diet, ensure our .Itis also used in other sectors such as animal foods or cosmetics.(Anderssonetal. 2001).

2.5.3.The Use of Yeast

Commonly used probiotics include Saccharomyces cerevisiae for enhancing the activity of beneficial microbes in the gastrointestinal tract, thus improving the digestibility of nutrients and production potential of the animals (New bold *etal*.1995; Singh et al. 1995; Wohlt et al. 1998), and Lactobacillus .for competitive exclusion of undesirable micro-organisms from the intestine, thus improving the health of the animal (Nader *etal*. 1993).

There is a lot of variation in the performance of the same animal fed on different species of probiotic, or even the same species of probiotic but different strains. (Newbold *etal* (1995) observed that different strains of S. cerevisiae had different effects on rumen bacteria in vitro and in sheep. The probiotics entering the gastrointestinal tract have to face certain environmental constraints, and different strains of probiotic cultures differ in their sensitivity towards them. Some factors such as lysozyme, pancreatic enzymes, low pH, organic acids and bile salts, have been indented against which sensitivity of various cultures should be tested during selection for use as probiotics (Jin*etal*. 1998).

Celik*etal* ,(2000) evaluated the effects of Saccharomyces serevisiae and Falavomycin on broiler growth performance. Three experimental diets were used ,1/control diet –no additives ,2/2mg flavomycin /kg feed and 3/ 0.2%saccharomyce serevisiae /kg feed .The results indicated that birds receiving 0.2% saccharomyesserevisiae consumed significantly much feed during- 37 days of experiment .

2.5.4.Mechanism of Yeast

Dry yeast in poultry includes: maintaining normal intestinal microflora by competitive exclusion and antagonism: and altering metabolism by increasing digestive enzyme activity and decreasing bacterial enzyme activity and ammonia production: and improving digestion, and stimulating the immune system,(Lutful, **2009**).

2.5.5.Effect of yeast on immune response of broiler chicks:-

Saccharomyces several studies have demonstrated that these products have a beneficial effect on broiler performance (Tortuero, 1973,Awad*etal*., 2009) by promoting intestinal microbiota balance (Fuller, 1989), modulation and pathogen inhibition (Samnya and Yamauchi, 2002; Chichlowsk*etal*., 2007), immunomodulation (Matsuzaki and Chin, 2000; Apata, 2008), and improvement of some blood biochemistry parameters (Jin*etal*., 1998; Ashayerizadeh et al., 2009). In addition, probiotics may improve the sensorial characteristics (Pelicano*etal*., 2003) and the microbiological quality of chicken meat (Kabir*etal*., 2005).

2.5.6.Mannanoligosaccharides:-

Mannanoligosaccharides, derived from yeast cell wall, are more complex than the name suggests; they are components of the outer layer of yeast cell walls and their components include proteins, glucans and phosphate radicals as well as mannose (Klis *etal*., 2002). The basic composition of the wall consists of mannan (30%), glucan (30%) and protein (12.5%). While the ratio of one component to another remains relatively constant from strain to strain, the degree of mannan phosphorylation and the interaction among the mannan, glucan and protein components vary

(Lyons, 1994). Mannanoligosaccharides contain protein which has relatively high proportions of serine, threonine, aspartic and glutamic acids, and a paucity of methionine (Song and Li, 2001).

G **ao*et al.* (2008)** noted that other mechanisms may be responsible for the effects of YC in monogastric other than modulation of microbial ecology**.** Mannan-oligosaccharide and 1,3 and 1,6 β –glucan are components of the YC wall that modulate immunity **(**ShashidharaandManal**,**2012).

Devegowda**,** 2003**),** promote growth of intestinal microflora**(**Spring***et al.*****,** 2000**)** and increase growth **(**Parks***et al*.., 2001).**

Many researchers referred an advantage of culture yeast that are fed to animals are responsible for production of vitamins of B complex and digestive enzyme and for stimulation of intestinal mucosa immunity and increasing protection against toxins produced by pathogenic microorganisms (Sarker*et al*., 1996; Martinez *et al*., 2004; Silversides *et al*., 2006). Some studies have confirmed the effects of yeast culture could be an alternative to antibiotic-based drugs in feed in broiler chicks (Hooge*et al*., 2003; Stanley *et al*., 2004).

It has been reported (Bonomi and Vassia, 1978; Ignacio, 1995; Onifade*et al*., 1999) that feeding yeast to chicks improves body weight gain and fee gain ratio. On the other hand, Madriqal*et al*. (1993) failed to observe a positive effect of feeding yeast on body weight of broiler chicks. Kanat and Calialar (1996) reported that active dry yeast effectively increases BW gains without affecting feed/gain ratio in broiler chicks. In contrast, supplementation of yeast to broiler diets improves feed/gain ratio but not growth rates (Valdivie, 1975; Onifade*et al*., 1999).

Whole yeast products or yeast cell wall components have been used to improve growth and affect the physiology, morphology and microbiology of the intestinal tract of both turkey (Bradley et al., 1994; Hooge, 2004b; Sims et al., 2004; Zdunczyket al., 2004; 2005; Huff et al., 2007; Rosen, 2007b; Solis De Los Santos et al., 2007; Huff et al., 2010) and broiler chicks (Hooge, 2004a; Zhang et al., 2005; Huff et al., 2006; Rosen, 2007a; Yang et al., 2008a,b; Morales ,et al., 2009).

2.6.Immunity :

Immunity is the state of having sufficient biological defenses to avoid infection, disease, or other unwanted biological invasion or The immune response immensely increases the inflammatory response and provides protection that is carefully targeted against specific antigens. Once it has been exposed to a new antigen it will store it in it's memory bank and react to it more intensely the next time around

2.6.1. The avian immune system is divided into two types:-

of immunity – innate and adaptive. Innate immunity can be thought of as the most basic tools the system has to fight off infection. These include physical and chemical barriers, blood proteins and phagocytic cells. The skin, mucosal epithelium, and gastric secretions are all examples of the various physical and chemical barriers pathogens have to evade. Complement is a serum protein that works with antibodies in order to lyse certain target cells. Several blood cells have phagocytic functions, meaning they engulf and remove pathogens, including macrophages, heterophils, thrombocytes, and natural killer cells. Innate immunity is considered the first line of defense and lacks specificity, protecting against multiple types of pathogens (Erf, G.F. 2004,2007).

Adaptive immunity takes over when innate immunity fails to stop an invading pathogen. Adaptive immunity involves targeted recognition of specific molecular features on the surface of a pathogen, resulting in a series of events intended to eliminate that pathogen and establish protection to subsequent challenges (. Erf, G.F. 2004). This specific protection can be provided by either passive immunity or active immunity. Passive immunity consists of the maternal antibodies that are present at hatch, providing protection against various pathogens the hen was exposed to or vaccinated against.

Active immunity is the immunity that the bird develops through exposure to pathogens, either by natural infection or vaccination, and can be further divided tohumoral and cell-mediated immunity.

Certain types of antigens or modifications of antigens will preferentially lead to development of either cell-mediated response or humoral immunity against the antigen (. Erf, G.F,2004.). Antigen presenting cells, like macrophages, process and present an antigen to lymphocytes, both B and T lymphocytes (Sharma, J.M 1991). Those two lymphocyte types are the main cells responsible for humoral and cell-mediated immunity.

2.6.2.Humoral Immunity:-

Antibodies are the functional unit of humoral immunity. They are secreted by plasma cells, a type of B lymphocyte. When on the surface of a B cell, these molecules are immunoglobulins, following secretion they are termed antibodies. Antibodies are found in body fluids and tissue spaces and are most effective in eliminating They react to surface proteins on bacteria, parasites or viruses, attaching to specific molecular features on the pathogen. Three classes or isotypes of immunoglobulins are found

in the avian immune system: IgM, IgY (IgG) and IgA (. Lillehoj, H.S., Trout, J.S 1996).

Additionally, antibodies can bind to antigens that are expressed on the outer surface of infected cells, triggering cytotoxic cells to eliminate infected or neoplastic cells in a process known as antibody dependent cellular cytotoxicity (. Erf, G.F 2004).

T-cells are the primary cells active in CMI, composed of several different cell types discussed later. This portion of the immune system functions through a portion of the immune system functions through a direct effectors, an activated T cell, and its target cell contact (Qureshi, M.A., Hussain, 1998).

2.6.3.Cell-Mediated Immunity (CMI)

For endogenous antigens or intracellular pathogens, the cell-mediated immunity is the functional aspect of the avian immune system that works to destroy the infected cell or enter the cell to eliminate the antigen (. Erf, G.F 2004).

2.6.4.Lymphocyte Classes:-

Two types of avian lymphocytes are present – B lymphocytes and T lymphocytes.

The letter associated with each type represents its site of differentiation – B-cells in the Bursa of Fabricius and T from the thymus (. Barnes, H.J.2nd ed. C. Riddel, ed. American Association of Avian Pathologists,). Each type plays different roles; B lymphocytes are more associated with humoral immunity, while T cells are the

main players in cell-mediated immunity.

antigens (Ratcliffe, M.J.H.1989). The cells will then mature, proliferate, and differentiate to form either plasma cells or memory cells. These two types of cells will produce antibodies that function to agglutinate or neutralize antigens and are the basis for maternal protection. T lymphocytes are the antigen specific cells in the CMI response, capable of recognizing a wide range of pathogens. T lymphocytes are further characterized by their role, cell surface markers and T cell receptors. All T cells express a CD3 complex on their cell surface, independent of the T cell receptor present. T he per cells are typically identified by CD4 surface markers, serving primarily a regulatory role in adaptive immunity, both cell-mediated immunity, both cell-mediated and humoral. T helper cells function to activate macrophag by secretion of cytokines and stimulate B cell growth and differentiation. Cytotoxic T lymphocytes can be identified by typically having CD8 on their surface and are important in lysis of virus infected cells and tumor cells (Erf, G.F.2004).

When either lymphocyte class is stimulated by antigen, proliferation and differentiation occurs into effectors and memory cells. Memory cells are recalled when the same antigen is encountered again, quickly differentiating into effector cells to promptly remove the antigen. Production of a wide variety of antigen-specific memory cells is the basis of disease protection and vaccination concepts (Erf, 2004, Scott, 2004).

2.6.5.Lymphoid Organs:-

Various organs function to differentiate avian immune cells, either as primary lymphoid organs or secondary lymphoid organs. The thymus, Bursa of Fabricius, and bone marrow are considered to be the primary avian lymphoid organs. The secondary lymphoid organs are the spleen,

mucosal associated lymphoid tissues, diffuse lymphoid tissues and lymph nodes, and germinal centers (Qureshi, 1998).

The thymus is a flat, multiple lobed organ, located in the neck, in close association with the vagus nerve and jugular veins. This is the primary location for development of T lymphocytes. T lymphocytes complete maturation as they move from the cortex to the medulla of the thymus, entering general circulation through modularlyvessels . The thymus also contains a population of B lymphocytes, approximately 5-20%, with the percentage being age dependent (Reese, 2006.).

2.6.6.Tools to measure immune responses

Classical immunology tests to measure the cell-mediated immune response aretime-consuming and cumbersome, limiting their use to research purposes.

Examining the cell-mediated or humoral immune regresses at around 14-20 weeks (Olah, *etal* 2003) or surgical means to replicate T or B cell depletion. Mitogen assays are used to examine transformation of lymphoid cells following exposure to nonspecific mitogens – substances that induce cell division. Recently through the ability to produce monoclonal antibodies to avian cytokines, a potential diagnostic test has been reported that appears to reflect the CMI response to a pathogen.

An enzyme linked immunosorbant assay (ELISA) test has been developed to detect chicken interferon-ã after antigen recall stimulation or vaccination. By selecting a cytokine common to all immune responses, this ELISA has the potential to be utilized for a variety of pathogens (Lambrecht*et al* , 2004.). This test could become a future diagnostic tool available to more accurate reflect CMI responses to poultry diseases.

Diagnostic tools routinely used to determine disease exposure and vaccine response measure antibody levels produced in response to a include the Mycoplasma plate agglutination tests, when a clumping reaction is observed when antibodies are present in serum reflective of active infection. Traditional serological diagnostic tests

Likehemagglutination inhibition (HI) and ELISA measure antibody responses to a wide assortment of avian pathogens.

2.6.7.Immunosupression:-

The damage to the immune system can be due to many intrinsic and extrinsic factors resulting in reduced effectiveness of the immune system .It can take several forms , which vary in degree , direction (Aini ,1999).Immunosupression is define as a state of temporary or permanent dysfunction of the immune response resulting from damage to the immune system and leading to increased susceptibility to disease (Dohm and Saif 1984) and often leading to sub-optimal antibody response (Lutticken1997).

A lower than expected antibody response after vaccination is probably the most frequently observe sign of immunsupression , besides an increased incidence of secondary infections The term immunosupression is often used as an excuse for poor performance ina flock when the actual cause is unknown .Diagnosis of immunospression is usually done by histoiogical techniques to establish depletion or degeneration of lymphoid tissues, which are important signs of generalizeimmune unresponsiveness .This leaves antibody response and histopathological investigation of bursa, thymus ,liver and spleen , as important ways to investigate immunosupression in chicken (Lutticken1997).

(Saif ,1998) observed that IBD of chickens and heamorrhagic enteritis virus (HEV) in broiler were diseases that induce immunosupression , resulting in lowered ressistance to a variety of infectious agents and poor response to commonly used vaccines .The IBDV and HEV infections are wide spread in commercial chicken and acute stage of the disease, the immunspression that follows and the wide spread distribution of both diseases is a major factors contributing to the economic significance of both diseases. The mechanism of immunospression for both are lymphoid. A study was conducted by Bohara in 1996 to evaluated the pathogenicity and immunospressive effect of three intermediate and one hot strain of IBD vaccine . Sixteen days old broiler chickens were vaccinated with these vaccines Three weeks after IBD vaccination they were also administered the NDV 4HR vaccine, they observed clinical signs and lesion on body surfaces and bursa typical for IBD infection.

Immunospressive effect were evaluated by determining the response of IBD vaccinated birds to NDV vaccine .(Nakamura and Nunoy ,1992) reported that the immunospressive effect of infectious bursal disease virus (IBDV) on vaccination against Newcastle disease (ND) was compared among 2-3 and 4 week – old chickens inoculated with the highly virulent IBDV field isolate 90 -11 and the reference serotype 1 strain GBF1. In all age groups , isolate 90-11 severely suppress antibody response to ND vaccination and protective phytohemagglutinin of splenic lymphocytes from chickens inoculated with isolated 90-11 or strain GBF-1 was significantly lower than un inoculated control

2.6.7.ELISATechiniqic :

The ELISA is a rapid test used for detecting and quantifying antibodies or antigens against viruses, bacteria and other materials. This method can be used to detect many infectious agents affecting poultry and livestock. In ELISA technology, the solid phase consists of a 96-well polystyrene plate, although other materials can be used. The function of the solid phase is toimmobilize either antigens or antibodies in the sample, as they bind to the solid phase(Tabidi ,2002). After incubation, the plates are washed to remove any unbound material. In some assays the conjugate is then added to the plate and allowed to incubate. The conjugate consists of either an antigen or antibody that has been labeled with an enzyme. Depending upon the assay format,theimmunologically reactive portion of the conjugate binds with either the solidphase or the sample(Mohammed *etal* (2000). The enzyme portion of the conjugate enables detection. The plates are washed again and an enzyme substrate (hydrogen peroxide and a chromogen) is added and allowed to incubate. Color develops in the presence of bound enzyme and the optical density is read with an ELISA plate reader(Miers*etal* 1983) .

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CHAPTER THREE

MATERIALS AND METHODS

3.1. MATERIALS

3.1.1- The Study Area:-

This experiment was conducted at the premises of Department of Animal Production, the College of Agricultural studies, Sudan University of Sciences Technology, Shambbat. The experiment started in the twenty seventh of September and ended in the third of November ,2014.

3.1.2- Housing:-

The experiment was carried out in open sided poultry house (15 sq. M), with a height of three meters. The ground covered with litter about three to four centimeters with floor , and corrugated iron sheet roof. The house extended east-west. It was divided into five pens three square meters . Each pen was divided into three units hosting (7)chicks. each unit was provided with a feeder and rounded drinker. Natural light during the day and artificial light at the evenings.

3.1.3.The Temperature:-

The experimental poultry house is manual curtain management, and no environmental control. Average, minimal and maximal house temperatures were daily recorded from dry-bulb thermometers placed in two different points of the house during the experimental period. Average maximal and minimal temperatures of 40ºC and 28ºC were recorded.

3.1.4. Experimental Birds:

The total number of 105 one day old unsexed (Aberker strain))broiler Chick, with average of 46 grams were subject to 45 day experimental period. On arrival chicks were received and unpacked inside the deep litter experimental house, during which period they received a dose of multivitamins in drinking water and sugar solution 5% concentration to reduce transportation stress.A commercial pre-starter diet was offered to the birds for seven days of an adaptation period. Birds were visually inspected for health and vigor, and weak and under-weight chicks were excluded from the experiments.Birds were randomly assigned to each of the experimental pens at the rate of (5). The mean body weight of the (5) groups of chicks was nearly similar, within the range 150- 155 g/bird.

3.1.5-Design Used of the Experiment

The chicks were randomly divided into (5) experimental groups with (3) replicates were (7) chicks replicates. The first group (A) fed on basal diet as control group (without treatment) the second group (B) fed on basal diet with antibiotic (neomycin) the main experimental groups (C, D and E) were fed on basal diet supplemented with yeast (SC) at level (0.1,0.2,0.3%) respectively. During the experiment birds were weighed weekly and feed intake per pen was recorded the same time. The measured performance parameters' includes. Final body weight (g) body weight gain (g) feed intake feed conversion ratio and mortality rate.

3.1.6- Vaccination Program:

Based on a local vaccination program Chicks in all groups were vaccinated against Newcastle disease infections Bronchitis were done in hatchery ND+IB spray One day old and vaccinated against Gumbora

disease (IBD) 78 at 12 day old. Vitamin ADEs were used in drinking water. The dosage was then repeated at 21 and 28 days of age for Newcastle disease and Gumboro, respectively.

3.1.7. Experimental Diets:

The diets were formulated from the local feed ingredients commonly used for poultry feeding in the Sudan and an imported super-concentrate was incorporated in all the diets at inclusion rate of 5%. In addition to that used for poultry feeding in the Sudan and an imported super-concentrate was incorporated in all the diets at inclusion rate of 5%. In addition to that .lysine – and DL- Methionine were fed to upgrade the protein quality to meet the requirement for these essential and critical amino acids for broiler chicksas outlined by NCR, (1994).The ingredients percent compositions and calculated chemical analysis of the basal diet was presented in table(1)and (2).The experimental diets were fed for 6 weeks.

3.2 Methods:

3.2.1 Management:

Throughout the experimental periods the birds, house equipment,

health, lighting, watering, feeding and other similar management activities were under observation and control. Any abnormal signs observed, were corrected and recorded. Performance data were collected daily or weekly throughout the experimental periods and included.

3.2.2-Plan of Work

To take blood sample at the week after vaccination and blood samples were collected from the jugular vein for Detection of antibodies against Newcastle Disease Virus (NDV) and Infectious Bursal Disease Virus

(IBD) in serum of immunized chickens was performed by enzyme link immunosorbent assay (ELISA),Soba.

-Composition and calculated analysis of the experimental diets fed during starting (1 – 21) and finishing periods (22-43) days of age in table (1) and table (2):-

Table (1):-The ingredient percent composition of the basal diet(as fed):-

Component	%
Sorghum	64
Groundnut cake	28.61
Wheat bran%	1
Broiler concentrate	5.00
Di calcium phosphate	0.5
Salt(sodium chloride)	0.25
Methionine	0.14
Total	100%

Broilerconcentration 5%*:ME poultry2.122kg , crude protein 40%, crude fiber 1.5%lysin 13.5% Methionine ,5.9% meth+cystin6.25%, calcium 6.3%. phosphorus tot 3%, sodium 1.5%vitamin a250,000IU/kg vitaminD3 60,000IU/Kg, vitaminE800ppM, vitamin K60ppM,vitaminB140ppM,vitaminB2 100ppM, pantotheinic acid 200ppM,niacin800ppM,vitamin B650ppM, vitamin B12 300ppb vitaminC4000ppM,biotin 2000ppb,folic acid 30ppM,cholin chloride3000ppM,betain 3000ppM,iron(fe)1.000ppM,coper(cu)300ppM,zinc(zn)1000ppM,mangan

ese(mn)1600ppM,iodine(i)20ppM,selenium(se) 5ppM,cobalt(co)12ppM, m16-phytese15000FYT antioxidant add.

Table(2):- Calculated analysis of the basal experimental diet on dry matter basis(DM)

Component %	Basal diet
Dry matter	89.20
Crude protein	23.10
Crude fiber	4.44
Ether extrat	3.90
Ash	4.60
Nitrogen free extrat	63.96
Saccharomyces crevevisiae	0.68
Phosphorus	0.45
Metabolizable energy *Kg(ME)	3102.84

Calculating according to(Elis,1981Kuku Bulletin)

3.3.Performance values:

3.3.1 Feed Intake:

The feed intake was determined by weighing feed on weekly basis

added to the feeding troughs in two dosages. At the end of each week, the residual was reweighed and recorded for estimation of average feed intake on grams per bird per (g/b/d) bases.

3.3.2 Body Weight and Weight Gain:

Body weight was measured once a week and the weekly weight gain in each age interval was calculated for each chick in gram/ bird bases.

3.3.3 Feed Conversion Ratio (FCR):

The feed conversion ratio was obtained by dividing the total grams of feed consumed during the experimental period by the number of grams of weight gain (g feed/ g gain).

3.3.4 Mortality Rate:

Dead birds were removed, recorded and inspected for possible causes of death.

The total number of dead birds was used for calculating livability or

mortality percentages(%) .

3.4.Organs Relative Weights:

Organs relative weights demonstrate the post-slaughter differences between major organs weights which include the heart ,liver and gizzard among all groups

3.5-Statistical Analysis:

Collected data was subject to statistical analysis using (SPSS)version 11.5.one –way-ANOVA was used to determine the analysis of variance for studies variables and the Duncan's methods(1955) to separate between treatments means. Furthermore regression and correlation were also done to determine the relationship between variables.

CHAPTER FOUR

RESULTS

4-1 Effect of Using Different Level of Yeast(Sacchromycescerevisiae:Sc) as Feed Addition on Performance Value in Broiler Chicks in Compare with Neomycin and Control Diet:

4.1.1Feed Intake (g):-

Feed intake for commercial broilers was not significantly ($p>0.05$) affected by the studied treatments as shown in table(3) and fig2 but both neomycin and 0.1 yeast treatments increased it as compared to control by about 1.8% and 2.2% respectively.

4-1-2 Body Weight (g) ;

Application of 0.3% yeast to the broiler rations significantly increased($p<0.05$) the body weight as compared to all other treatments with an increasing estimated by about 23.3% and 24.3% as compared control and neomycin ,respectively (Table3 and fig2).on other hand ,both o.1% and 0.2% yeast treatments increased body weight by about 5.9% and 5.4% as compared to control and by about 6.4% and 5.9% as compared to neomycin treatment respectively but with no significant ($P>0.05$) differences Table(3)

4-1- 3- Body Weight Gain (g);

Similarly ,body weight gain of broiler was significantly increased ($p<0.05$) under 0.3% yeast treatments and compared to all other treatments ,with an increasing estimated by about 25.2% and 26.1% as compared to control

and neomycin , respectively table (3)and fig2 moreover,0.1%yeast treatment increased the body weight gain as compared to control and neomycin by about 5.9% and 6.6% ,respectively .while 0.2% yeast treatment increased it by about 5.1% and 5.8% ,respectively .

4.1.4.Feed Conversion Ratio:-

As shown in table (3) and fig4 that 0.3% yeast treatment reported a significantly($p<0.05$) best mean of feed conversion ratio as compared to all other treatments , which showed no significant ($p>0.05$)differences between them .The reduction percentage in feed conversion ratio under 0.1% and 0.2% yeast treatment was about 21.7%, 25.0%,18.2% and 18.2% respectively table (3) fig4.

4.1.5. Effect of Using Different Level Yeasts as Feed Additive on non Carcass Components in Broiler Chicks in Compare with Neomycin:-

4.1.5.1.Head Weight :-Table(4) and fig7 shown that treatments were not significantly affected head weight of broiler ,but 0.1%, 0.2% and 0.3% yeast increased it as compared to control by about 25.%, 18.8% and 25%,respectively ,where neomycin increased it by about 4.4% .

4.1.5.2.Gizzard (g) :-

Similar, as shown in table (4) and fig7 that treatments did not significantly affect gizzard weight ,but this was increased by about 2.5%,6.2%and 6.2%under 0.1%,0.02% and 0.3% yeast treatments as compared to control ,respectively while neomycin increased it by about 7.5%.

4.1.5.3.Liver Weight :-

Both 0.2% and 0.3% yeast treatments increased liver weight of broiler than both control and neomycin ,with a increasing estimated by about

53.3% and 46.7% ,respectively for control and about 30.7% and 25% respectively for neomycin(table 4 and fig7) On the other hand ,no significant differences were shown between neomycin ,0.1% yeast and control ,but neomycin increased liver weight as compared to control by about 17.3%,while 0.1%yeast increased it by about 6.7% (table (4) and fig7.

4.1.5.4.Fabrious Weight (g):-

Fabrious weight was not significantly($p>0.05$) affected by treatments ,but it was increased under neomycin ,0.1%,0.2%and 0.3% yeast treatments as compared to control by about 71.7%, 85.8% ,93.1% and 53.5% ,respectively ,table(4) and fig7

4.1.5.5.Carcass Weight(g):-

Carcass weight was significantly higher ($p<0.01$) under 0.3% yeast treatment as compared to all other treatments ,which showed no significantly differences between them(table (4) and fig6) .The percentage of increasing in carcass weight for 0.3% yeast treatment as compared to control and neomycin was about 30.2% and 34.4% ,respectively .Where as0.1% and 0.2% yeast treatments increased it as compared to control by about 5% and 2.3%,respectively (table 4 and fig6

4.1.5.6.Lipid Weight(g):-

Application of yeast 0.1% yeast to broiler ration significantly ($p<0.05$) increased lipid weight as compared to both control and 0.3%yeast ,but not neomycin and 0.2% yeast treatment (table(4) and fig7 .The percentage of increasing in lipid weight for neomycin ,0.1% and 0.2% yeast as compared to control was about 42.5% ,92.6% and 50% ,respectively .

4.1.5.7.Heart Weight (g):

Both neomycin and 0.1% yeast treatments had a significantly higher mean($p<0.01$) of heart weight than control ,0.2% and 0.3% yeast treatments ,with an increasing estimated by about 76.7%, and 73.3% for neomycin and 0.1%yeast treatments as compared to control , respectively (table 4 and fig7).

4.2.Effect of Application of Yeast on Broiler Antibodies Titer:

Level of antibodies titer for Newcastle Disease and Bursal Infectious Diseases for each replication in each treatment was calculated according to ANTILOG ruler .The data was subjected to statistical analysis to compared between means of treatments for titer level .

4.2.1.InfectiousBursal Disease:

Antibodies titer for IBD was significantly different among treatments at the 2nd reading (43days),but not at the first reading .As shown in (table 3 and fig 9) that both neomycin and 0.2% yeast had significantly higher means ($p<0.05$) of titer 1241 and 1355 ,respectively than control (495) ,whereas the difference between 0.1% 0.3% yeast and control was insignificant .During this period (2nd reading),titer level was increased under neomycin ,0.1%, 0.2% and 0.3% yeast treatments in comparison to control by about 150.7% ,71.3% and 46.3% ,respectively , table(5).Mean while ,although the above mentioned treatments during the 1st reading did not significantly affect titer level of IBD ,but they increased it as compared to control by about 14.3% ,131.2%,18.8% and 81.7% ,respectively ,table(5) .In contrast to Newcastle Disease ,titer level for IBD was reduced at the 2nd reading as compared to the 1st reading by

about 68.2% , 30.6 %, 76.4%, 26.7% and 74.4% for control ,neomycin ,0.1%,0.2% and0.3% yeast respectively , table(5).

4.2.2.Newcastle Disease(ND):

Table (6)and fig9 show that levels of titer were not significantly different between applied treatments for both readings (at 18days and43days of age). Although treatments did not significantly affect titer levels for ND ,but application of 0.1%, 0.2%, 0.3% yeast at the first reading increased titer level as compared to control by about 141.1%, 116.5% and 107.4% respectively , where during the 2nd reading these treatment increased it as compared to control by about 51.1%, 22.8% ,and 3.1%,respectively table(6) On the other hand ,neomycin increased titer level as compared to control by about 148.2% and 34.8% for the 1st and 2nd readings ,respectively ,table(6).Furthermore ,as shown in table(5) and fig9 titer levels for ND were increased with time (1st and 2nd reading) for all treatments . The percentage of increasing under the 2nd reading as compared to the 1st reading for control ,neomycin ,0.1%, 0.2% and 0.3% yeast were 164.4% ,43.7%, 65.6% ,178.9%, and31.5% respectively , table(6).

4.2.3. Economic Evaluation:

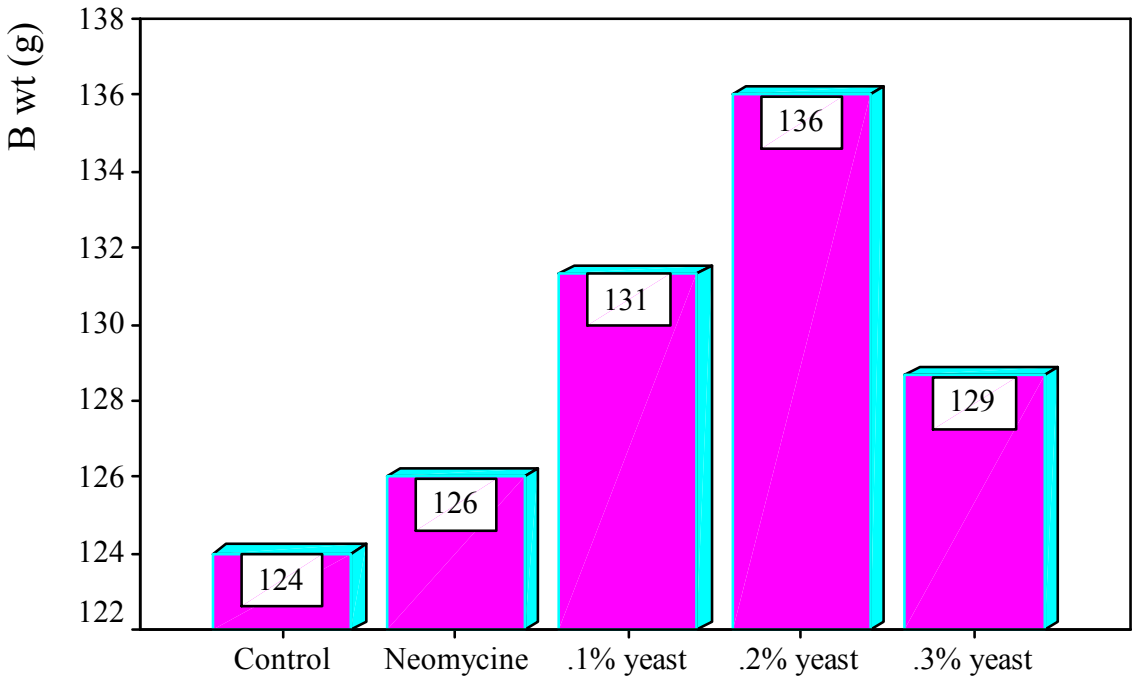
The total cost and output as well as the net profit for commercial broiler which were fed by using different levels of yeast (Sc)for five weeks was calculated and the result was presented in table (7) .The items that used to calculate the economic visibility were chicks purchase cost of management ,yeast cost ,price /kg meat .As shown in table 4, the net profit/kg/meat for 0.1%, 0.2% ,0.3% yeast was 11.18, 10.68 ,and 14.82 SDG respectively while it was 10.27% and 9.78SDG for control and neomycin ,respectively .On the other hand ,the profitability ratio/kg/meat

for the above mentioned yeast treatments in relation to control was 1.09, 1.04 , and 1.44 ,respectively whereas it was 0.95 for neomycin.

Table(3):- Effect of Using Different Level Yeasts as Feed Additive on Performance Value in Broiler Chicks in Compare with Neomycin ad Control:-

Treatments	Feed intake(g)	Initial body wt (g)	Body wt (g)	Body wt gain(g)	FCR
Control	3773.3a	124.0c	1760.0b	1637.6b	2.3a
Neomycin	3840.oa	126.bc	1751.7b	1625.7b	2.4a
o.1% yeast	3856.0a	131.3ab	1863.7b	1733.7b	2.2a
0.2% yeast	3788.7a	136.0a	1855.3b	1719.3b	2.2a
0.3% yeast	3786.3b	128.7bc	2178.0a	2049.3a	1.8b
S.E ±	41.1	2.5	71.4	70.8	0.1

Fig.(1): Initial body Weight of Commercial Broiler Groups Before Application of Treatments.



Peformance values

Fig.(2):Effect of Application of Different Levels of Yeast and Neomycin on Performance of Broiler Chicks.

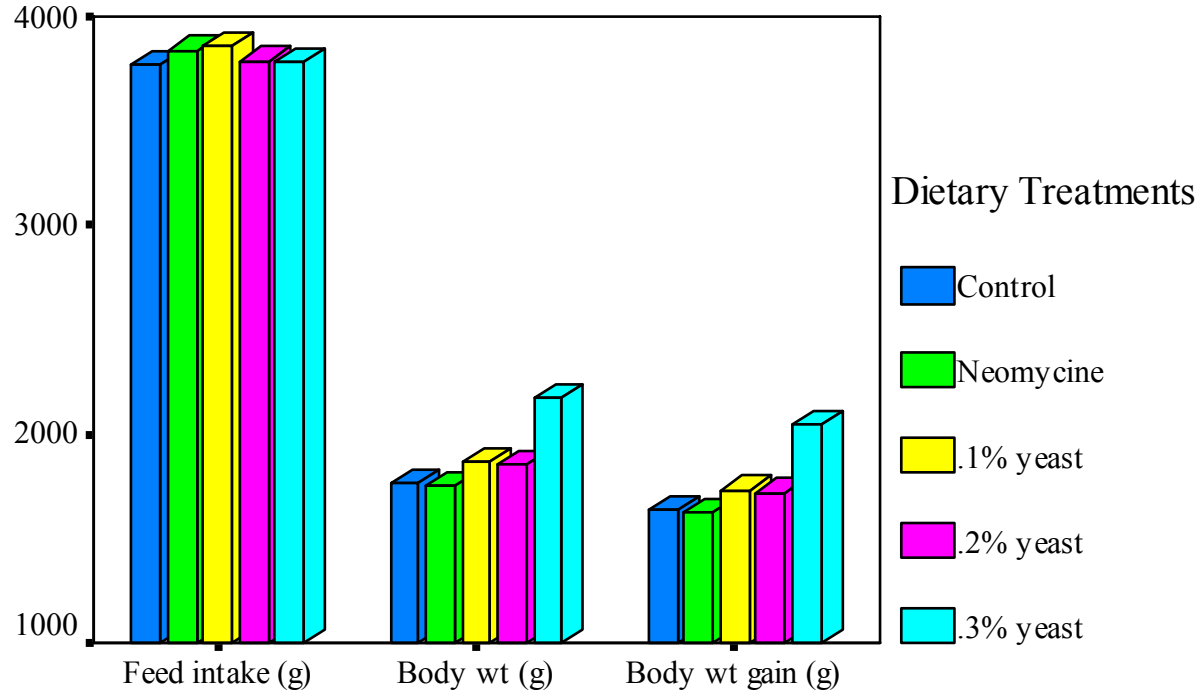


Fig.(3):Body weight gain of commercial broiler as affected by treatment.

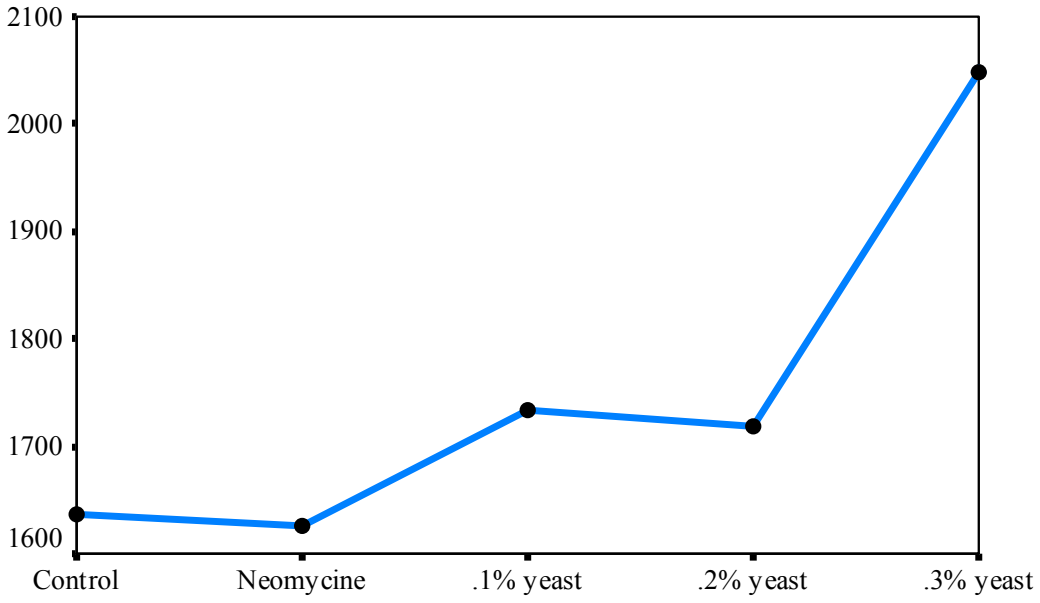


Fig.(4): Level of Feed Convertion Ratio as Affected by Different Levels of Yeast and Neomycin Treatments.

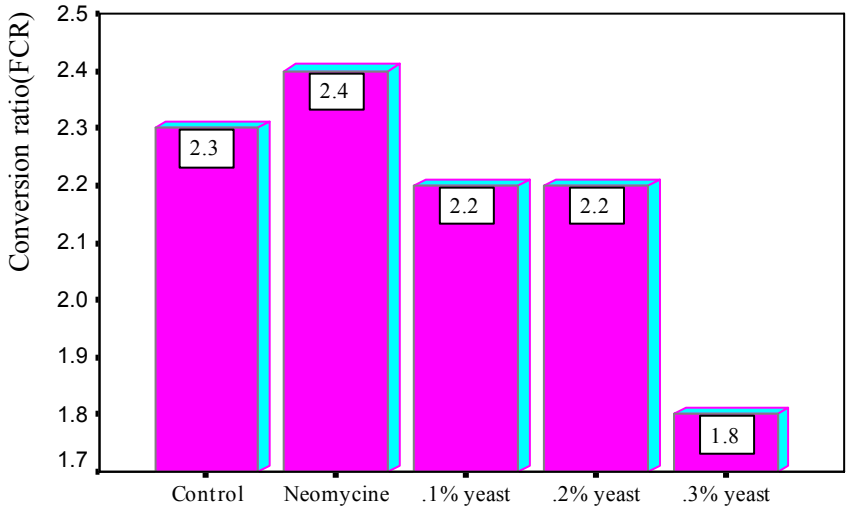
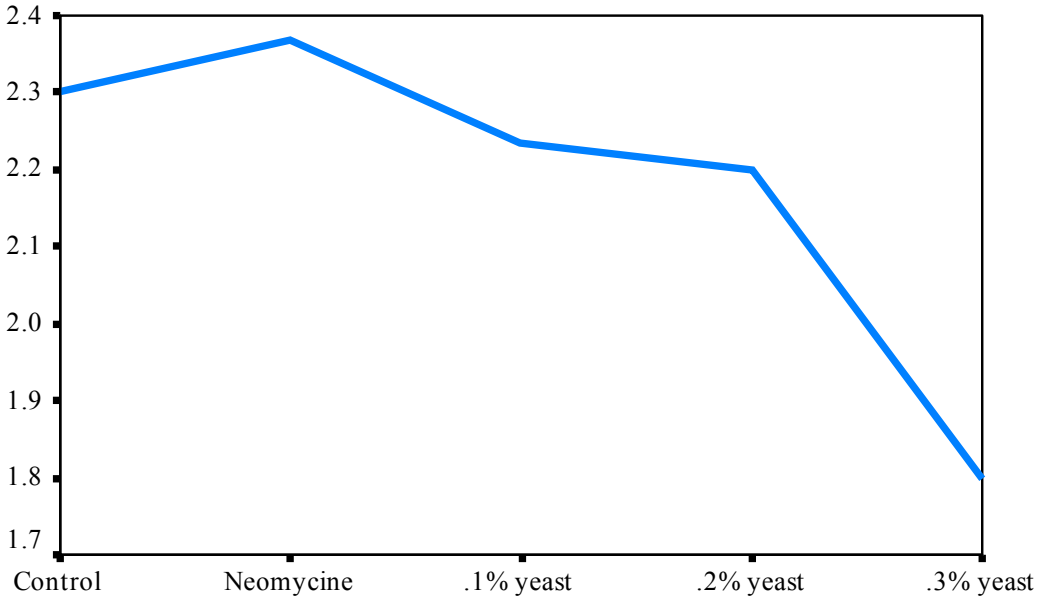
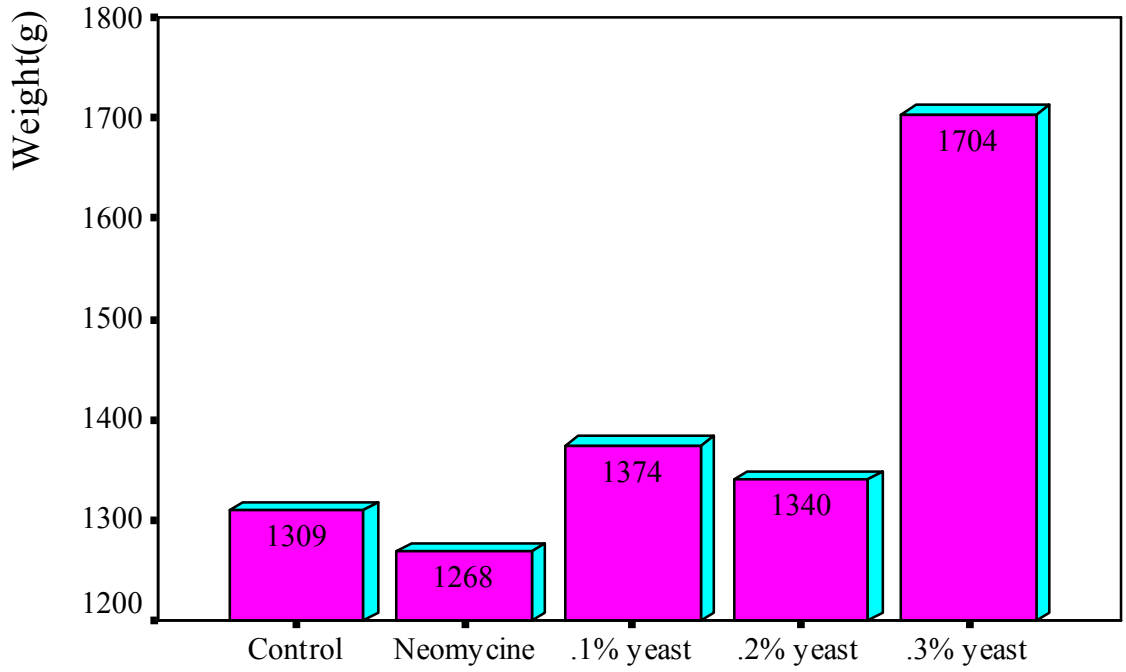


Fig.(5):Feed Conversion Ratio of Commercial Broiler as affected by Treatments.



Fig(6) Carcass Weights after Using of Different Levels of Yeast and Neomcin Dietary Treatments.



Performance Values

Table(4):- Effect of Using Different Level Yeasts as Feed Additive on non Carcass Components in Broiler Chicks in Compare with Neomycin:-

Treatment	Head	Gizzard	Liver	Fabricuos	Carcass	Lipidwt	Heart
Control	32.0a	26.67b	25.0b	2.33a	1309.b	13.3b	١٠
Neomycin	35.0a	28.33b	29.33	4.00a	1268.3b	19.ab	17.7
0.1%yeast	40.oa	27.33a	26.7b	4.33a	1374.3b	25.8a	17.3
0.2%yeast	38.33 a	28.33a	38.3b	4.50a	1339.8b	20.ab	10.3
0.3%yeast	40.oa	28.33a	36.6a	3.76a	1704.0a	13.3b	10.8
E.S±	2.45	1.56	2.11	0.63	32.46	3.01	0.98

Fig.(7): Non Carcass Components

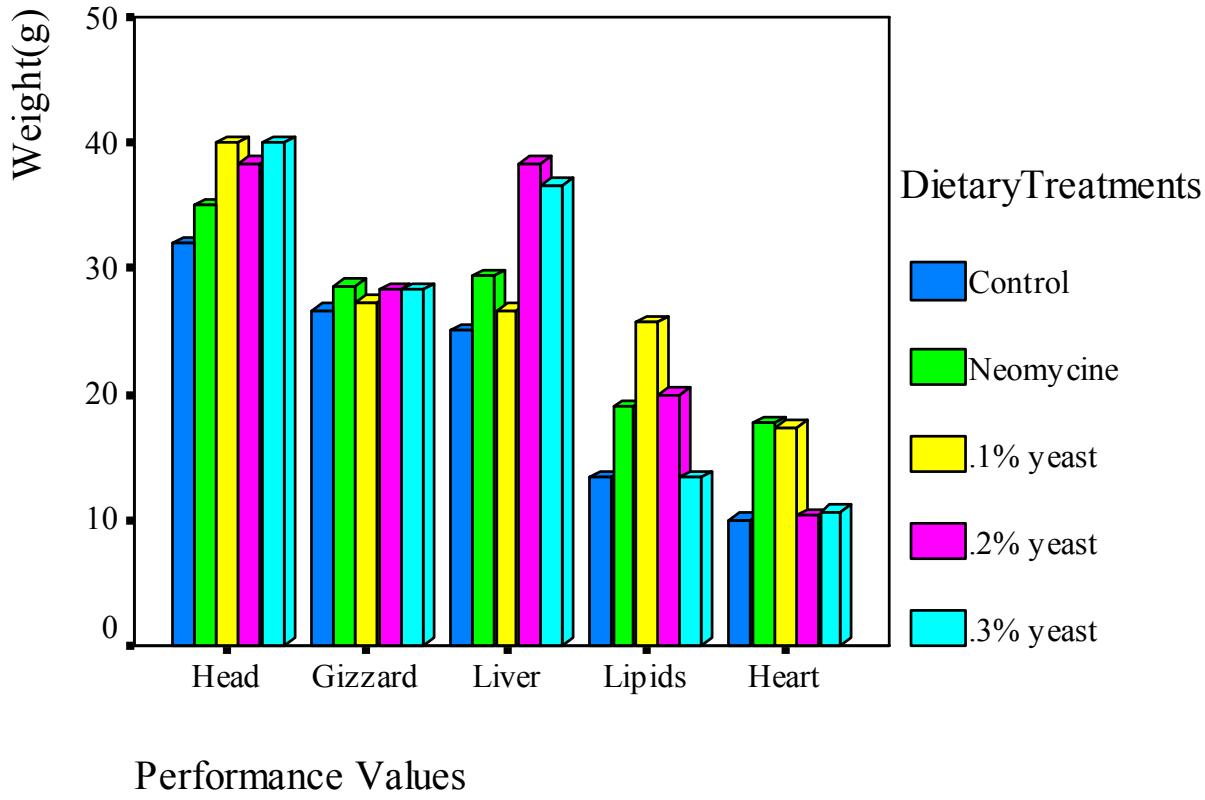


Fig. (8): Rate of Mortality among Commercial Broiler as Affected by treatments by treatments

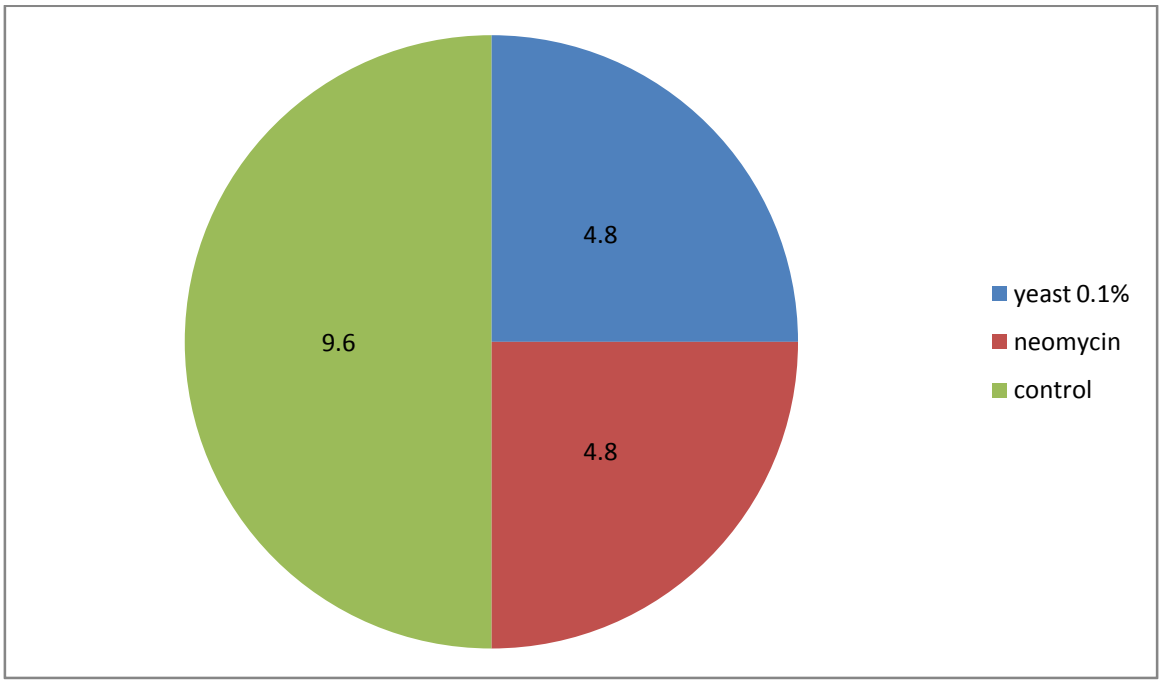


Table (5)Detection of Antibodies Titer after Vaccination of Infectious Bursal Disease Vaccine in Five Treatments:-

Treatments	18 days of age (1st reading)				43days of age (2nd reading)			
	Treatmen	Sample ratio +ve(s/p)	$\log_{10}tit$	Titer	Treatmen	Sample ratio +ve(s/p)	$\log_{10}tit$	Titer
Control	0.370	0.423	3.19	1556a	0.187	0.164	2069	495b
NEOMYCIN	0.329	0.489	3.25	1788a	0.272	0.358	3.09	1241a
0.1%YEAST	0.496	0.870	3.55	3598ab	0.229	0.260	2.93	848ab
0.2%YEAST	0.335	0.503	3.27	1849a	0.284	0.386	3.13	1355a
0.3%YEAST	0.431	0.722	3.45	3827ab	0.214	0.226	2.86	724b
S.E±				828.8				176.5
+ve control				0.553				0.553
-ve control				0.115				0.115
Corrected +ve				0.438				0.438
C. V(%)				61.8				32.8

Table (6)Detection of Antibodies Titer after Vaccination of Newcastle Disease Vaccine in Five all Treatments:-

Treatments	18 days of age (1st reading)				43days of age (2nd reading)			
	Treatmen	Sample ratio +ve(s/p)	$\log_{10}tit$	Titer	Treatmen	Sample ratio +ve(s/p)	$\log_{10}tit$	Titer
Control	0.299	0.370	3.22	1307a	0.508	0.856	3.54	3456a
NEOMYCIN	0.491	0.817	3.51	3244a	0.604	1.079	3.66	4660a
0.1%YEAST	0.481	0.794	3.50	3153	0.664	1.218	3.72	5221ab
0.2%YEAST	0.323	0.427	3.24	1522a	0.572	1.005	3.62	4245a
0.3%YEAST	0.432	0.681	3.58	2711a	0.591	0.882	3.55	3564a
S.E±				27.6				
+ve control				0.570				0.570
-ve control				0.139				0.139
Corrected +ve				0.431				0.431
C. V(%)				44.7				57.3

Fig.(9): Detecion of Antibodies Titer after Vaccinaation of ND and IBD Vaccine in Five Treatments.

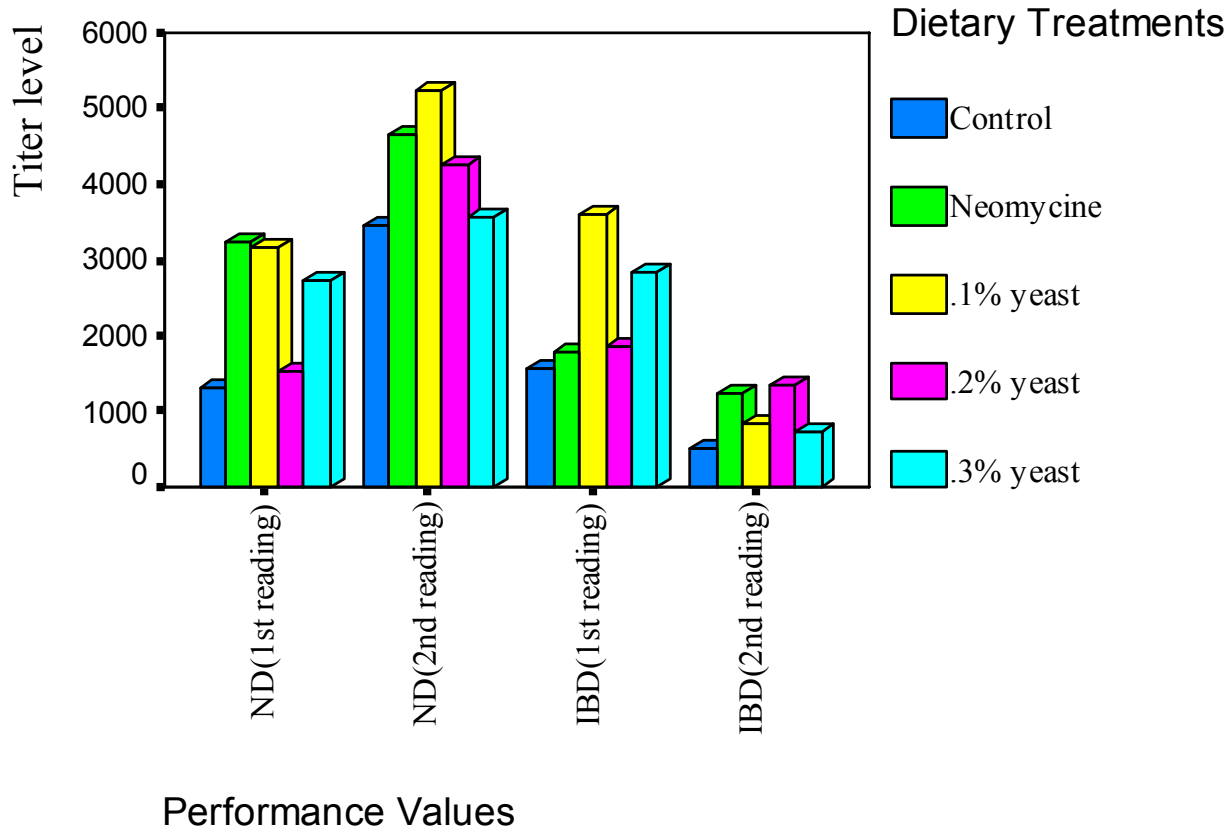


Table (7):- Economic Evaluation for Commercial Broiler as treated by Levels of Yeast as Compare to Neomycin and Control:

Item	A	B	C	D	E
cost of chick purchase	4.500	4.500	4.500	4.500	4.500
Management	4.000	4.000	4.000	4.000	4.000
Feed	17.33	17.14	17.37	17.38	17.37
Total cost	25.83	25.64	25.87	25.88	25.87
Average carcass wt	1309.0	12668.33	1374.33	1339.67	1704.00
Price/kg	٣٠	٣٠	٣٠	٣٠	٣٠
Total cost	39.27	38.05	41.23	40.23	50.12
Total cost	25.83	25.64	25.87	25.88	25.87
Net profit/bird	13.44	12.41	18.36	14.31	25.25
Net profit /kg meat	10.27	9.78	11.18	10.68	14.82
Probability ratio/ kg meat	1.0	0.95	1.09	1.04	1.44

*The total cost was calculated according to September 2014

*price /kg was 30SDG According to October 2014

CHAPTER FIVE
DISSCUSSION

Feed additives such as antibiotics and probiotics play important role in poultry industry. The continuous use of antibiotics tends to stimulate development of resistance from harmful micro-organisms hence the current outcry from consumer society and health sector to ban it use as feed additive in animal and poultry feeds (Cavazzoni*et al.,* 1998). Consequently there exists the need to replace antibiotics with probiotics. Probiotic is a microbe organism used as additive to diet in order to improve the performance of beneficial microbes in the gut of animal or birds. The present study show that when different levels of yeast (Saccharomyces Cerevisiae) was applied as feed additives as a natural alternative to antibiotics , there was significant difference in the body weight gain and feed conversion at 0.1%, 0.2 % and 0.3% levels of yeast concentrations applied. This is consistent with similar reports by (Cross, 2002, Tabid*etal* 2013 ,Gheisari ,*etal* 2012 ,Santin*etal*.2001, Zang*etal*.2005, Gao *etal*, 2008, Paryad and Mahmoudi, 2008, Celik*etal*, 2001). The feed intake show that there is no significant difference among the different treatment groups. This agree with the finding of (Flemming et al, 2004 ,Mahmoudi, 2008, Brummer et al 2010 and Tabidi et al a2012) and disagree with (Zang*etal* 2005 and Abaza *etal* 2008). These results might be due to that dry yeast has very biological values and B-complex vitamin that confirm by authors that Phaff*etal* , (1978), Onifade*etal* (1999) , Celk*etal* (2001) and Seyyed (2011). Several authors have indicated that the different results of using yeast as feed additive in broiler chicken depends on many factors like the physical state of yeast

added into fed broiler chicks (dry, wet and fermented yeast), applied methods in feed or drinking water, age of birds and level of biosecurity (Perreten, 2003; Stanly, 2004; Gao*et al.,* 2008 , Mukhtar et al 2014). Who found that addition of dietary dry yeast (Sc) improved the body weight gain and feed conversion ratio of the broiler chicks .this improvement in body weight gain and feed conversion ratio may be attributed to culture yeast (Sc) contains yeast cells as metabolites such as peptides ,organic acids,oligosaccharides , amino acids ,flavor and aroma substances, and possible some unidentified growth factors which have been propose to produce beneficial performance responses in animal production (Gao et al, 2008)moreover, the supplement yeast increased digestion and absorption of nutrients (Savage et al 1985, Bradley and Savage, 1995 ,Kornegay et al 1995, Abaza et al ,2008 and Gao et ai 2008) The present study ,finding there was a significant change in carcass ,which showed that 0.3% dry yeast give significantly higher dressing percentage and lower abdominal fat compare to other treatments, the present finding was agreement with (Gheisari*et al* 2012) and disagree with ManalAbou El-naga 2012) and (kannan*etal* , 2005 , Zang*etal* 2005 and paryad and Mohmoud , 2008 , Abaza et al 2008).During experimental period ,the birds did recorded cases of mortality in control and neomycin groups . Other hand, yeast as probiotic stimulates a protective immune response sufficient to enhance resistance to microbial pathogens. The gut and its resident microbiota play an essential role in shaping the immune system of poultry (Noverr and Huffnagle, 2004). Germ-free animals have less developed gut–associated lymphoid tissue, but gut colonization in these animals by members of commensal gut microflora results in the enhancement and diversification of the antibody –mediated immune response. (Lee *et al.,* 2004) reported that probiotic treated birds had

significantly more serum antibody than birds that were not treated with probiotics. LutfulKabir, (2009) noted the action of dry yeast in poultry includes(1)maintain normal intestinal microform by competitive exclusion and antagonism (2) altering metabolism by increasing bacterial enzyme activity and ammonia production (3) improving immune response.

The results showed that broiler chicks supplemented with Sc had significantly ($p<0.05$) lower mortality rate compare with control and neomycin groups .The low mortality among the chicks groups fed on dietary Sc may be due to ability of Sc reduce of disease infections (Line et al, 1997), through increasing concentration of comensal microbes or pathogenic bacteria intestinal tract (Spring et al 2000 and Stanly et al 2004).Also several workers , Spring, et al 2000) ,The studies effect of feeding different levels (0.1%, 0.2% and 0.3%) of dry yeast on antibodies titer against (IBD) and (ND) of broiler chicks at 18, 43 days of age, was calculated according to titer Log 10. The use of yeast (S.C) treatments had no significant effect ($P>0.05$) on antibody titer level against (IBD). However, at 18 days of age, chicks fed diet containing 0.3% dry yeast had a higher antibody titer (IBD) compared to chicks fed with diet containing neomycin and control groups. The use of S.C (dry yeast) had no significant effect ($P>0.05$) on antibodies titer against NDV at 18d and43d of age ($P>0.05$) but chicks fed with diet containing 0.3%dry yeast had a high antibodies titer against NDV than control group. Furthermore, the addition of dry yeast S.C than control group and inclusion of 0.3%to diet than 0.1% and 0.2% elicited high serum antibodies titer against IBD and NDV. It seems that of dietary of dry yeast S.c could be an effective stimulator on humoral immune response in chickens. The ELISA test

proved to be faster ,reliable and accurate for detection of antibodies in compare with others conventional methods of diagnostic technique and also ELISA test is more sensitive and can be used to detect the presence of antibodies, (Marquardt , et al., 1980).

The result of economical evaluation of experimental diets showed that supplementation of dietary(Sc) improved the performance of broiler chicks and resulted economical benefit. Profitability ratio 1.4 of group (0.3%) was the highest on the tested groups .This result agree with (Tabidi,2012, Abaza *etal* 2008, Mustafa 2012)who found the addition of Sc at level of 0.3% to broiler diet gave the better relative economic efficiency compared to the neomycin and control diets.

CONCLUSION AND RECOMMENDATIONS

The results of this investigation showed that addition of dry yeast in feed a broiler feed improved body weight gain , feed conversion ratio and reduce mortality rate without any effect on feed intake and dressing percentage of the broiler chicks.

The feeding of Yeast at level 0.3% resulted in highest body weight gain. - The study confirmed that economic benefit of using the dry yeast as feedadditive to broiler feed by reducing economics cost compared to control and neomycin.

RECOMMENDATIONS:-

- The obtained result of this study suggest that yeast as probiotic exerted beneficial effect on performance values of broilers chicks. Therefore this dry yeast as natural probiotic may used as alternative to replace the adverse of side effect of antibiotic .Although using yeast in broiler supplementation can improve solid immunity to chicks after vaccination.
- We recommend **ELISA** technique as serosurveillancetechnique as gives accurate , rapid and specific serologic test for the detection of IBD and NDV antibody in chicken serum because the system is computerized.
- We recommend other studies of use dry yeast without vaccination and compare to this is study for antibodies titer by ELISA test

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APPENDIX(1)

Correlation between titer level and performance parameters:-

As shown in table 5 that ND titer showed +ve , weak to medium and insignificant correlation with performance parameters (feed intake, body wt , body gain and feed conversion ratio and ,except ND titer at the 1st reading with feed conversion ratio and ND titer with feed intake and body weight gain in the 2nd reading , which showed –ve correlation .On the other hand ,IBD titer in most cases showed +ve ,weak and insignificant correlation with the performance parameters , except IBD titer with feed conversion ratio at the 1st reading and IBD titer with body wt and body weight gain at the 2nd reading , which showed –ve correlation (table 5). Furthermore ,table 5 also indicated that feed intake had +ve ,very weak and insignificantly correlation with body weight ,body weight gain and feed conversion ratio ,whereas both body weight and body weight gain had –ve ,very strong and significant ($p<0.01$) correlation with feed conversion ratio.

Relationship (regression) between titer level and performance parameter:-

As shown in table 6 that there were +ve and insignificant relationship (regression) between ND titer level and the performance parameters (feed intake) ,body weight ,body weight gain and feed the 1st and 2nd reading . The B-value means that for each one unit increasing in independent variable (antibodies titer),the dependent variables (feed intake ,body wt ,body wt gain and feed conversion ratio)change (increased and decreased)by the B- value .According for each one ND titer increasing ,feed intake ,body wt ,body wt gain and feed conversion ratio at the 1st reading increased by 0.019, 0.024 , 0.032 ,0.000 ,respectively whereas at the 2nd reading body wt gain decreased by o.oo8 g (Appendix 1) .similarly Appendix 2, shown that the relationship between IBD titer and all performance parameter was +ve and insignificant ,while durinthe 2nd reading , the relationship with the relationship with body wt and body wt gain was –ve and insignificant .

Appendix(1):Relationship between Newcastle Disease vaccine titer and performance parameters.

Variable	B-value	d.f	S.E	P-Value	Level of significant
18days of age (1streading)					
Feed intake	0.019	١٤	0.01	0.099	ns
Body wt	0.024	١٤	0.04	0.550	ns
Body WT gain	0.032	١٤	0.04	0.425	ns
Feed conversion ratio	0.000	١٤	0.01	0.640	ns
43days of age (2nd reading)					ns
Feed intake	0.000	١٤	0.01	0.963	ns
Body wt	0.003	١٤	0.02	0.883	ns
Body WT gain	0.008	14	0.02	0.720	ns
Feed conversion ratio	0.000	١٤	0.001	0.758	ns

Ns: No significant relationship.

Apendex(2)::Relationship between infectious Burasl Disease vaccine titer and performance parameters.

Variable	B-value	d.f	S.E	P-Value	Level of significant
18days of age (1streading)					

Feed intake	0.017	١٤	0.009	0.089	ns
Body wt	0.14	١٤	0.039	0.217	ns
Body WT gain	0.043	١٤	0.031	0.194	ns
Feed conversion ratio	0.000	١٤	0.000	0.238	ns
43days of age (2nd reading)					ns
Feed intake	0.028	١٤	0.035	0.453	ns
Body wt	-0.037	١٤	0.116	0.755	ns
Body WT gain	-0.064	١٤	0.114	0.587	ns
Feed conversion ratio	0.000	١٤	0.000	0.523	ns

Ns: No significant relationship.

Apendex(3): Correlation between titer levels and other studied variables .

	Coefficient	NDtiter(1st reading	NDtiter(2nd reading	IBDtiter(1st reading	IBDtiter(2nd reading	Feed intake	Body wt	Body wt gain	FCR
NDtiter(1st reading	r	١							
	P	_							
NDtiter(2nd reading	r	-0.136							
	P	0.628	١						
IBDtiter(1st reading	r	0.588*	_	١					
	P	0.021	0.052	_					
IBDtiter(2nd reading	r	0.215	0.854	0.061	١				
	P	0.441	0.051	0.830	_				
Feed intake	r	0.442	0.858	0.454	0.218	١			
	P	0.099	-0.013	0.089	0.435	_			
Body wt	r	0.168	0.963	0.338	-0.088	0.031	١		
	P	0.550	0.041	0.217	0.755	0.914	_		
Body wt gain	r	0.223	0.883	0.355	-0.153	0.075	0.944	١	
	P	0.425	-0.101	0.194	0.587	0.791	0.000	_	
FCR	r	-0.132	0.087	-0.325	0.179	0.037	-0.927	-0.983**	١
	P	0.640	0.758	0.238	0.523	0.897	0.000	0.000	_

*:significant correlation at 0.05

**:significant correlation at 0.0

Appendix (4):Mean square showed the effect of application of yeast on antibodies titer of Newcastle and Gamboro diseases in commercial broiler.

Source of variation	d.f	1st reading	2nd reading	1st reading	2nd reading
		NDantibioticstiter	NDantibiotictiter	IBDantibiotictiter	IBDantibiotictiter
treatments	٤	2504954.8ns	1271998.9ns	2233959.6ns	386300.8*
Error	١٠	1138767.0	6746438.7	2060531.6ns	93446.8
C .V(%)		44.7	57.3	61.8	32.8

ns :not significant

*