Effect of Dietary Hyacinth Bean (*Lablab purpureus*) on Broiler Chicks Performance

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Dedication

To my Beloved Family my Mother, Father, Brother

And Sister who Apply Continues Encouragement.

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ABSTRACT

The experiment was conducted to determine the effect of decorticated Hyacinth bean on the performance of broiler chicks and some blood parameters.

One hundred and twenty eight one day old unsexed broiler chicks (Hubbard) were used, chicks were divided into four groups with four replicates of 8 birds / replicate, the birds were fed on 4 experimental diets, with varying levels of Hyacinth bean (0, 5, 10, and 15%).the diet were formulated to meet the nutrients requirements according to NRC (1994), diets were iso-caloric and isonitrogenous. complete randomized design was used.

Feed and water were provided ad libitum, feed intake and body weight were weekly recorded, weight gain and FCR were calculated, the experiment lasted for 7 weeks.

At four week of age, two birds were selected randomly from each replicate, and were slaughtered and allowed to bleed to collected serum, serum was analyzed (total protein, inorganic phosphorus and calcium) and right tibia were removed for use to determine bone ash.

The results of the experiment indicated that dietary treatments had significant ($P< 0.01$) effect on feed intake, weight gain and feed conversion ratio (FCR). Inclusion of Hyacinth bean in broiler diets resulted in reduction in feed intake and weight gain. Moreover, the treatments had no effect on dressing percentage. Rickets occurred in 12.5%the birds fed 10 and 15% Hyacinth bean

Supplementation of Hyacinth bean in broiler diets had no significant ($P>0.05$) effect on serum calcium and total serum protein. However, the treatment had significantly decrease ($P<0.01$) serum phosphorus and bone ash.

The results of recovery period indicated that birds fed previously Hyacinth bean had improved in feed intake, weight gain and feed conversion ratio (FCR).

ملخص الأطروحة

صممت هذه التجربة لدراسة أثر إضافة بذور لوبيا عفن إلى علائق مكتملة العناصـر الغذائيـة علـى إنتاجية كتاكيت اللحم وبعض قياسات الدم في الكتكوت.

و قد اخضع للتجربة مائة وثمانية وعشرون كتكوتا عمر يوم غير مجنس من سلالة هبـرد وتـم توزيـع المعاملات لاربعة مكررات لكل معاملة بواقع ثمانية كتكوت لكل مكرر .

وتمت تغذية كتاكيت التجربة على أربعة علائق متساوية تقريبا في النتروجين والطاقة وهى: علائـق مضاف اليها لوبيا عفن بنسبة0%, 5% , 10%, 15%وذلك حسب توصيات مجلـس القـومى للبحـوث الامريكى (1994) لتفى الاحتيجات الغذائية للدجاج اللاحم وتم استخدام النظـام العـشوائى الكامـل فـى التجربة .

تم توزيع الكتاكيت عشوائيا مع توفير الماء والغذاء. واستمرت التجربة لمدة سبعة أسابيع والقياسات التي تمت هي , كمية العليقة المستهلكة والكفاءة الغذائية وزيادة وزن الكتكوت جمعت أسبوعيا خـلال فتـرة التجربة و في عمر أربعة أسابيع , تم اختيا ر ثمانية دجاجات عشوائيا لكل معاملة دجاجتان لكـل تكـرار ووزنت ثم ذبحت وأخذت عينات لمصل الدم ورماد العظم
(من شظية الأرجل اليمنى).

وفى فترة الثلاثة أسابيع الأخيرة تمت تغذية جميع المعاملات على عليقه الكنتـرول. أظهـرت نتـائج التجربة أن تغذية الكتاكيت على العلائق التجريبية لديها تأثيرا معنويا ($P<0.01$) علـى نـسبة العلـف المستهلك, وزن الجسم المكتسب ومعدل التحول الغذائى. ادخال 10-15 %من اللوبيا عفن فى العليقـةادت الى حدوث كساح فى الكتاكيت بنسبة 12.5% وذلك ادى الى انخفاض رماد العظم والفسفور الغير عضوى فى الدم كما لا يوجد فرق معنوي في نسبة الكالسيوم والبروتين في مصل الدم ولكن هناك فرق معنوي في نسبة الفسفور الغير عضوي و رماد العظم ($P<0.01$).

CHAPTER ONE

INTRODUCTION

Currently most grain legumes are grown specifically for human consumption and much of legume used for poultry comprises down-graded batches that are unsuitable for human use .however, some agronomists are of the opinion that legumes could be grown specifically for intensive livestock use at competitive prices (Robinson and Singh 2001).

One such legume is widely grown in Africa is *lablab purpureus* the bean can be used as seed for human and livestock consumption (Pulsegrave, 1968) and as forage for livestock

(Hendrickson and Myles, 1980) ; the bean is not well accepted for human consumption .thus the bean is readily available for incorporation in livestock diet ,

Dried seeds of *Hyacinth bean* contain 20-28 % crude protein some types are tasty and are eaten like other beans; their amino acid is moderately well balanced while is high in lysine content.

The mature seeds (especially dark color ones) must be boiled to become edible, for their contain tyrpsin inhibitor that is broken down by heat and toxic cyanogenic glucosid that is soluble in the cooking water.

The main objective of this work is to investigate the effect of feeding Hyacinth bean on broiler performance, and assessing the effect of on some blood parameters of broiler chicks.

CHAPTER TWO

LITRITURE REVIEW

2-1 Definition of *Hyacinth bean*

The *Hyacinth bean* is believed to have originated in India Deka and Sarkar, (1990) and was introduced into Africa from south East Asia During the eighth century (kuo, 1967).

Presently, *Lablab* is common in Africa extending from Cameroon and Zimbabwe, through Sudan, Ethiopia, Uganda and Tanzania Skerman *et al.*, (1988*). Lablab purpureus* family's is *fabacea* and common name is *Rongai Doclichos* and *lablab bean* in Australia – poor man bean and tanage bean in England, Lubia Afin in Sudan, Betas in Philippines and *Hyacinth bean* in Brazil (skerman *et al.*, 1988).

2-2 Description:

Hyacinth bean cultivated as annual or biennial plant , with bushy erect and vining twining forms , often behave as perennial in tropics , persisting for 2 or more years ; stem twining hairy , usually 2-3 m , leaves very broad ovate , the lateral one lopsided , 7.5 -15 cm long nearly as broad , rather abruptly acuminate ; flower

purple to pink or white 2-4 at each node in an elongating raceme , up to 2.5 c.m along ; pods flat or inflated (Duke ,1981).

2-3 Uses of Hyacinth bean

The mature seed is edible as long as it is thoroughly cooked (Hedrick,1972 and Harrison *et al*., 1975) It has a mild flavor, is rich in protein and can be used as staple food. The seed can also be prepared as tofu or be fermented into temperature in the same way that Soya bean are used in Japan (Facciolal and Cornucopia, 1990). young seed pods and immature seeds can be eaten raw or cooked .they can be used as a green vegetable like French beans (Duke,1985) .The leaves are used as greens just like spinach ,Flowers -raw and stems or cooked in soups,(Facciola and Cornucopia, 1990).

2-3-1 Medicinal uses:

It is used in the treatment for cholera, vomiting, charrhoea leucrrhoea, gonorrhoea The flowers are antivenins, Alex, teric and carminative, the stem is used in treatment of cholera the juice from the pods is used to treat inflamed ears and throats (Duke and Ayensu ,1985) The fully mature seeds are a thematic, antispasmodic, aphrodisiacal stringent. Digestive, febrifuge and stomachic (Chopra *et al.*, 1985) they are used in the treatment of sun stroke, nausea, vomiting, diarrhea, enteritis, abdominal pain, alcoholism and arsenism (Nguyen and Doan ,1989) .

2-3-2 Other uses:

The seed is well dried and roasted before uses, Plants are fairly fast growing and the bacteria on the roots enrich the soil with nitrogen. This makes them a good green manure crop, though they are only really, suitable for warm climate than Britain (Usher,1974).

2-4 Chemical Composition:

Legumes are good sources of protein, minerals, vitamins dietary fiber and complex carbohydrates (FAO, 1982).

2-4-1 Proteins:

Legume has a high protein content ranging from 17 to 25 % on dry weigh basis. Protein content of the edible protein of legume seeds is double than cereal and slightly lesser than meat fish and eggs (Walt and Merrill, 1963) Deka and Sakar (1990) reported the crude protein ranged from 22-31 %of Hyacinth bean. However (Schaaffhausen, 1963) reported that the crude protein of *Hyacinth bean* ranged from 25- 28 %.

2-4-2 Amino acid:

Hyacinth bean is a good source of the amino acid , lysine and as such complement the general low lysine content of maize (corn) Daka and Sarkar (1990) .General deficiency of lysine in most cereals e.g. sorghum and corn, thus consequence of their low content of albumins and globulin's (FAO, 1981).

Amino acid in *Lablab Purpureus* per 16 g were 6.8 g lysine , 0.9 g methionine , 6.6 g arginine ,4.6 g glycine , 3.2g histidine , 4.4 g isoleucine , 8.5 g leucine , 4.9 g phenylulanine , 3.6g tyrosine , 4.2 g threonine , 5.2 g valine , 4.5 g alanine , 12.0 g aspartic acid , 15.7 g glutamic acid , 0.6 g hydroxyl proline , 4.3 g proline and 5.4 g serine . *Lablab Purpureus* is especially low in the sulpher amino acids and tryptophan. (Duke,1981).

2-4-3Carbohydrates:

Legumes have a larger sugar content which, contain 1-2 %. Sucrose is a major sugar and unlike cereal, legumes contain appreciable quantities of oligosaccharides. These are indigestible by mammalian enzymes (FAO, 1982).

The seed in addition to large proportion of protein (26%) and starch (48%) it contains various other carbohydrates as dietary fiber or unavailable carbohydrates (FAO, 1981) , Ripped seed Hyacinth bean contain (per 100 g) 61.49 %.The total carbohydrates, 54.02 to 63.3 % (Deka and Sakar ,1990).

2-4-4 Dietary fiber:

Dietary fiber is the term defined by Trowel, (1972) as the skeletal that remains of plant cell that are resistant to hydrolysis by the enzymes of man. It includes cellulose hemicelluloses (water soluble including pectin) and lignin. Wide range of unusual storage dietary fibers is commonly associated with legume (FAO, 1981).

Deka and Sarkar (1990) reported the crude fiber of Hyacinth bean range from 7.6 -9.6%. Moreover Elhardallo and Eltinay (1985) reported 7.7 % for crude fiber Hyacinth bean .

2-4-5 Oil content:

Lipids surround the protein bodies and starch granules in legume seeds. In contrast to leguminous oil seeds most pluses contain only small quantities of fats (less than 3%) (FAO, 1982).

El hardallo and Eltinay, (1980) found that the seed of Hyacinth bean grown in Sudan contained 1.2 % oil.

2-4-6 Minerals and Vitamins :-

Deka and Sarkar, (1990) reported that five cultivar of Hyacinth bean the amount about (mg / 100g) of Ca, P, Phytate –P and Fe ranged from 36.0 -53.5, 388-483, 282-380 and 5.95 -6.90 respectively.

Aleter and Aladetini , (1989) reported that ash of *Lablab Purpuers* in average was 3.6 % , potassium was the most abundant mineral with mean value of 1.7 % while phosphorus was the least abundant with 8.5 Mg /g .

Ash of Hyacinth bean grown in Sudan was 3.6 % according to Elhardalloa and Eltinay, (1980). Ash of Hyacinth bean of dried seed contains (per 100 g) 3.8 g, Ca 98 mg, P 345mg, and Fe 3.9mg (Duke, 1981).

Dried seeds of Hyacinth bean contain (mg /100 g) , 0.15 mg pyridoxine, 1.2 mg pantothonic acid, 0 ug vitamins B12 and 21.8 ug folic acid (Duke, 1981).

2-5 Anti nutritional factor:

Aleter and Aladetini (1989) found that plant proteins are more resistant to break down in elementary tract that than animal proteins because of the presence of antinutritional factor(s) in the plant of many and various factors which may be present in food, particularly in food of plant origin there are two main classes of protein Antinutritional Factor(s) such as lectin and proteolytic enzyme inhibitor as trypsin inhibitors.

Legumes are also rich in many anti nutrients such as trypsin inhibitor, tannins, phytates and hemaglutanins or lectens, which can cause decrease in digestibility of nutrients or toxicity when taken in large concentration (FAO, 1982).

A major limitation to use of legumes in animal diet is the presence of anti – nutritional factors. Schaaffhausen (1963) reports that the leaves of *Lablab Purpureus* don't contain tannins, making them a good feed for monogastric animals. The seeds however, it contains antinutritional factor(s) such as tannins, phytate and trypsin inhibitors. Activity of these compounds could be reduced by processing methods such as removing the seed coat, soaking and cooking (Lambourne and wood 1985; Deka and and sarkar 1990).

For a proper nutritional assessment of antinutritional factor(s) like haemoglutinins and other toxic substances in *Lablab purpureus* seed. (Deka and Sarkar, 1990).

2-5-1 Tannin content:

Tannins can defined as phenolic compounds that contain a large number of hydroxyl groups and have a high molecular weight to form stable complexes with protein, carbohydrates and other molecules.

Price *et al.,* (1980) have reported that deleterious effect of various types of tannins include the following categories : depression of feed intake , formulation of tannin complexes with dietary protein and other food components, inhibition of

digestive enzymes, increased excretion of indigenous protein, negative effect in digestive tract and toxicity of absorbed tannins or their metabolites .

Vohra *et al.*, (1966) reported that tannic acid as low as 0.5% depressed growth significantly and level of 5% resulted in higher mortality rate (70%) in chicks during day 7-11 of the experiment, and also with female chicks more effected than male.

Deka and sarkar, (1990) reported that tannin content of five cultivars of mature seeds of *Doclichos lablab* ranged 2000-2205 mg /100 g morover Shastrog and John, (1991) reported 2.1 mg catchin equivelent /100g for tannin content of local Indian hyacinth bean .

Broiler chicks often suffer a problem of leg abnormality which is characterized by swelling and outward bowing of hock joint, this abnormality has been suggested to be enhanced by feeding of tannin containing diet (Armstrong , *et al.* , 1973 ; Ibrahim 1988) .

It's not clear how the tannin might cause the leg abnormality but it was the result of decreased bone mineralization caused by tannins Elkin *et al.*, (1978).

2-5-2 Phytic acid:

The other Anti Nutritional Factors which was found in Hyacinth bean is phytic acid. its well known that high levels of phytic can reduce the availability in plant products (cheryan *et al.*, 1983). The important role of phytic acid nutrition was due to its ability to form insoluble compounds with different mineral elements including

calcium, phosphorus, iron, magnesium, zinc, rendering them unavailable to the animal and resultant phytates being excreted in feaces (Vohra *et al.*,1965). Deka and Sarkar (1990) suggested that the level of phytic acid 1000 to 1350 (mg /100g). In *Lablab purpureus.*

2-5-3 Trypsin inhibitor:

Hyacinth bean has relatively higher invitro viscously and trypsin inhibitor activity values it similar to that chick pea (Robinson and Singh, 2001).

The role of trypsin inhibitor in suppression of the growth of experimental animals is now thought to be mainly due to their potential blockage of proteases in the intestine, also due to presence of toxic factor in unheated legume (Jaffe and Liner, 1967).

Protease inhibitors are generally responsible for poor digestibility of the protein. This reduction digestibility is invariable accompanied by enlargement of pancreas and this due to the action of trypsin inhibitors (Iryin and Lener, 1967).

Deka and sarkar , (1990) reported that the rate of trypsin inhibitor in Hyacinth bean 2400-3200 *(*mg /100g) **.**

2-6 Processing of anti-nutritional factor in Hyacinth bean :-

To increase utilization of legume grains by chickens (Robinson and singh, 2001) Suggested that the grains should undergo treatment such as dehulling or supplementation of the diet with enzymes.

Bressani (2002) reported that dehulling improved protein quality and digestibility of *phaseolus vulgaris* and suggested that this could be due to the removal of the seed coat tannins which may cause decreased protein digestibility. Cooking and soaking methods have also been used and the stability of anti-nutritional factors could be reduced by up to 15%, heat treatment has been widely used to improve the nutritional quality of grain legumes, but the major difficulty remains the choice of the type of heat, temperature and environmental conditions. The effect of heat may be specific for each legume and may depend on the concentration and location of the different heat-labile anti-nutritional factors. Thus, research should be carried out to define the proper treatment to enhance the nutritional value of specified legume grains for their use in broiler nutrition on small-holder farms.

Kvijayakumariet *et al.,* (1995) worked in effects of soacking, cooking and autoclaving on change in polyphenols, phytohaemagglutinating activity, phytic acid, hydrogen cyanide (HCN), oligosaccharides. and invitro protein digestibility was investigated in seeds of *Dolichos Lablab* and *var. vulgaris.* Both distilled water and

$NaHCO_3$ solution soaking and autoclaving significantly reduced the contents of total free phenolics (85-88%) compared to raw seeds.

Autoclaving (45min) reduced the content of tannins by up to 72% Soaking seemed to have limited effect in eliminating haemagglutination activity, completely. The reduction content of phytic acid was found to be some greater in distilled water soaking (28%) compared to $NaHCO_3$ solution soaking (22%). Only a limited loss in content of phytic acid was observed under cooking as well as autoclaving. Loss of HCN was greater under autoclaving (87%) compared to the other processes studied. of the three sugars anlalysed , soaking reduced the level verbascose more than that of stachyose and raffinose. Autoclaving reduced the level content of oligosaccharides more efficiently (67-86%) than ordinary cooking (53-76%). Autoclaving improved the in vitro protein digestibility (IVPD) significantly seemed to be the most efficient method in improving (IVPD) and eliminating the antinutrious investigated except phytic acid.

Devaraj and Manjunath (1995) worked in Proteinase inhibitory activity in ten different varieties of *lablab perpureus.L*. was determined. All the varieties tested exhibited appreciable level of proteinase inhibitory activity (PIA). The trypsin inhibitory activity (TIA) (Mean: 20170 TIU/g) was relatively higher than the chymotrypsin activity (Mean: 15380 CIU/g). Effect of temperature and cooking on PIA was studied. The nature of cooking medium and duration of cooking had

profound effect on the PIA. The dry fried seeds lost their PIA very rapidly (91% in 20 min). Seeds cooked in slightly alkaline medium lost their PIA quickly (89% in 30min) compared to those cooking in acidic (80% in 30 min) and neutral PH (83% in 30 min).

The PIA in green pods was also determined and they had only one third of the PIA (8200TIU/g and 8125 CIU/g) found in the dry seeds Castillo *et al,* (1980) suggested that soaking of the *Lablab purpureus* seed in water for at least 10 hours, followed by boiling for 30 minutes, completely destroys any trypsin activity present in the beans.

2-7 The role of Hyacinth bean in poultry nutrition:

Assessment of lablab *(Lablab purpureus*) leaf meal as feed ingredient and yolk colouring agent in the diet of layers was applied by Odunsi (2003). Feeding trial was conducted to determine the performance nutrient digestibility and egg quality of layers fed 0, 50,100 and 150 kg leaf meal of *Lablab pursuers*) Chemical analysis of *Lablab purpureus* (g/kg) crude protein 234, ether extract 19, crude fiber 83.4, ash 116 and nitrogen free extracts 467. Feeding Lablab at 100 and 150 g/kg significantly reduced feed intake and egg production while egg weight, feed conversion efficiency and body weight changes were not affected by dietary treatments.

Apparent nutrient digestibility of dry matter and crude protein decreased with Lablab inclusion while ether extract was not significantly influenced. Internal and

external egg quality values were comparable amongst dietary groups except for yolk color, which was affected higher in layers fed Lablab compared to those without. Boiling had no effect on the proportion of egg components but boiling affected a percentage reduction of 62, 56 and 52 in the egg yolk colour of 50, 100 and 150 g/kg lablab fed layers, respectively.

The persistence of the color change after withdrawal of lablab ranged from 5 days 50 g/kg to 15 days 150 g/kg, based on egg quality. Lack of mortality and similar biological efficiency, it may be possible to include *Lablab Purpureus* in layer diets up to 100 and 150g /Kg in situation of acute scarcity and or high cost of grain and concentrates .

Islam *et al.,* (2002) worked in Evaluation of toxic effects of *Lablab purpureus* seed meal as a dietary protein supplement in broiler feed. Group (A) was fed ration with ground raw country bean 250 mg/kg diet, group (B) with ration containing ground fried country bean 250 mg/kg diet supplemented with methionine and lysine (1g/kg) diet and group (C) control diet. Weight, feed intake and water consumption and presenting signs were recorded daily for 36 days. groups A and B showed toxic signs such as anorexia, depression, drowsiness, incoordination, recumbency and ruffled feathers.

The control group had the highest feed intake followed group B and then group A. reduction in body weight were recorded on the 7^{th} , 14^{th} , 21^{st} , 28^{th} , and 36^{th}

day after feeding with raw and fried bean seed supplemented meal, due to the low nutritive value and the anti-nutritive effects of proteinase inhibitors, tannins, phytic acid, lectins. There were increases in weight of intestinal, pancreas and gizzard of groups A and B due to the present of lectins and trypsin inhibitors. Raw and fried bean seed meals were toxic when supplemented at 12.5% in diet of ground broilers.

Sarwatt et al, (1991) worked on effects of substituting *dolichos bean* meal with soya bean meal on the performance of broiler chicken, Two hundred Cobb broiler chicken one day-old were randomly allocated to five rations containing levels of *dolichos beans (Lablab purpureus*) meal at 0, 5, 15, 20 and 25 percent and *soya bean (Glycine max*) meal at 25, 20, 10, 5 and 0 percent. Feed intake, feed utilization efficiency, growth and mortality rates were determined from 2 to 8 weeks at which time the birds were slaughtered, and dressing percentages and organ weights were determined.

As the level of dolichos bean meal increased there was a decrease in crude protein and an increase in crude fiber in the diets, but the changes were not affected. Weight gain was highest (28.6 g/day) for the ration containing 25 percent soya bean meal and lowest (26.6 g/day) for the diet containing 25 percent dolichos bean meal. Feed intake was highest for the ration containing 25 percent *Dolichos bean* meal but there was no difference between the treatments. Although the mortality rate was highest (16%) in the diet containing 25 percent *Dolichos bean* meal, the beans were

well accepted by the birds, and the protein appeared to be well utilized, with a feed gain ratio of 3.02. This value was only slightly lower than that recorded for the diet containing 25 percent soya bean meal (2.78).

Robinson and Singh (2001) worked in the effect of Hyacinth bean, *chick pea* and *Mung bean* on layer performance. The material tested in this trial were *Lablab bean* (100, 200 and 400 g/kg), chick pea (200 and 300 g/kg) and Mung bean (300 and 450 g/kg) there were also mash and pellet control treatments without grain legumes and all diets were formulated to similar nutrient specifications. The start of trial at 17-18 weeks of age, parameters measured were egg number, egg mass, egg weight, feed intake, and body weight.

Treatments mean performance results over the experimental period that *mung* bean (450 g/kg) and *Lablab* at all three concentrations were associated with significantly adverse effects when compared to the control diet.

The diet containing 400 g/kg Hyacinth bean resulted in lower egg number, egg mass output and feed intake than any of the other treatments ($P<0.001$).average egg weight of birds given the 400 g/kg Lablab diet was lower than that of birds given 100 g/kg Hyacinth bean diet. egg number and egg mass output of birds given the 450 g/kg mun*g* bean diet were lower than with the control or 300 g/kg mung bean diet . Birds given *chick* pea or Hyacinth bean at the highest concentration lost most weight.

CHAPTER THREE

MATERIAL AND METHODS

The experiment was carried out in the premises of the faculty of animal production, university of Khartoum during the period from September29-2005 to November 17 -2005.

3-1 Experimental birds:

One hundred and twenty eight one day old chicks (hubbard) purchased from commercial company in Khartoum. Chicks were divided randomly into sixteen pens, 8 chicks / pen and four replicate / treatment. The average of the initial weight was between 50 – 56, 59. The pens were randomly distributed among the experimental diet.

3-2 Experimental ration:

Four experimental ration (A, B, C and D) consist of local available ingredients and were formulated to contain the same ingredients, sorghum, ground nut meal, sesame meal and different levels of decorticated Hyacinth bean:

A: control ration without adding decorticated Hyacinth bean was 0%.

B: added level 5% of decorticated Hyacinth bean.

C: added level 10% of decorticated Hyacinth bean.

D: added level 15% of decorticated Hyacinth bean.

The experimental ration was prepared to meet the nutrient requirement of broiler according to NRC (1994) (table 2).

Table (1) Proximate analysis (%) of decorticated Hyacinth bean:

Items	*Hyacinth bean*
DM	94.50
CP	28.70
NFE	59.07
Fat	1.7
CF	2.01
Ash	3.02
Tannin	0.06
Trypsin inhibitor	0.45
ME* MJ/Kg	11.45

ME* Calculated according to equation of Lodhi *et al*., (1970

Table (2): Ingredient composition of experimental diets (%):

Ingredient	Hyacinth bean level (%)			
	0	5	10	15
sorghum	63.3	59.9	55.94	52.84
Ground nut cake	18	14.15	11.5	7.5
Sesame cake	11.35	13	13.6	15.33
Superconcentrat*	5	5	5	5
Di-Ca-phosphate	1.61	1.63	1.9	1.78
Salt	0.25	0.25	0.25	0.25
Premix**	0.25	0.25	0.25	0.25
Hyacinth bean	-	5	10	15
Lysine	0.04	0.08	1.45	1.9
Oil	0.2	0.74	0.11	0.15

Super concentrate* contains (%) : CP 40, Lysine 12 , Methionine 3 , Methionine +Cystine 3.2 , Ca 10, P 4 , CF 2 , ME 2100 Kal / Kg .

Vitamins and minerals premix** provided per Kg of experimental diets : Vitamine A 8000 IU, Vitamine D3 1400 IU , VitamineE 2 IU , Vitamine K3 2 mg , Vitamine B2 4mg ,Vitamine B1 2 mg , Ca – d – pantothenare 5 mg , Nicotin amine 15 mg , cholin choloride 100 mg , Folic acid .5 mg , Vitamine B 12 mg , Iron 22 mg , Manganese 33 mg, C op 2.2 mg , Cobalt .5 mg , Zinc 25 mg , Iodine 1.1 mg .

Table (3) calculated and Determined chemical composition of experimenta Rations on dry matter basis:

Calculated composition:

	Hyacinth bean level (%)			
compound	0	5	10	15
ME (kcal/kg)	3106.39	3106.49	3106.02	3106.64
CP %	22.93	22.93	22.93	22.93
Ca %	1.22	1.23	1.29	1.27
Available P %	0.6	0.61	0.66	0.63
Lysine %	1.10	1.10	1.10	1.10
Methionine %	0.46	0.46	0.45	.0.45

Determined composition:

DM %	94.26	93.70	94.29	94.47
CP %	23.6	23.6	22.3	23.1
EE %	3.87	3.17	4.30	4.50
Ash %	6.98	8.52	9.08	10.6
CF %	4.67	4.25	5.51	7.10

3-3 Housing and management:

The experiment was carried out on deep litter floor system. The house long axis was situated in an east-west direction. The building was constructed from iron post, short brick wall 60 cm. with cement red bricks. the floor was made of bricks covered with concrete and the roof was made of galvanized aluminum . The house consisted of 16 pens which were arranged inside the house beside the four walls. The dimensions of each pen were (1.0 X 1.0 meter) before the commencement of the experiment, the house was cleaned and disinfected with formalin, then sawdust was used to offer convenient bedding at a depth of 5 cm. Each pen was provided with clean disinfected feeder and drinker. Light was maintenant 24 hours a day naturally and artificially using 60 Watt bulbs.

3-4 Experimental procedure and data collection:

Live weight gain and feed intake were weekly recorded, weight gain and feed conversion ration (FCR) were also calculated for individual replicate of each dietatry treatment .At four weeks of age, two birds were selected randomly from each pens, and were slaughtered, allowed to bleed, sample of blood were taken in sterilized tube and left to clot the serum were separated and centrifuged at 3000 r.p.m for 5 minute and stored in deep freezer , for later analysis .sign of leg abnormality were recorded when it occurred.

The right tibia of four week old chicks were cleaned of adhering tissue and articular cartilage then dried at 150^{oC} and ashed at 600^{oC} bone ash were determined. Then the live birds were fed by control diet for another three weeks. At the end of experiment birds were fasted overnight except from water, from each dietary treatment (2 birds per replicate were randomly selected and weighed individually, and then it was slaughtered.

After bleeding the birds were immediately immersed in hot water, defeathered manually. The legs from the hock joints,head and viscera were removed.

After drainage the warm carcass was weighed and recorded then calculated dressing percentage by the expressing hot weight to the life weight was calculated.

3-5 Chemical analysis:

Proximate analysis of Hyacinth bean (table 1), the ration and bone ash (table 3 and 5) were done according to procedure of (AOAC, 1982).

Seed analysis for tannin determination described by Price *et al.*, (1978).

Total protein was analyzed by Bruit method as described by Weischelbaum (1946). And Ca serum was analyzed according to the method described by Trinder (1960) appendix (6). Serum inorganic phosphorous was determined by the method described by (Varley, 1967).

3-6 Statistic analysis:

Completely randomized design was used in this study with 4 treatments of experimental diets and replicated four times with 8 birds for each replicate. The data obtained from the experiment were subjected to analysis of variance according to SPSS using computer program. Means were compared using Dancans multiple range tests.

CHAPTER FOUR

RESULT AND DISSCTION

The result of chemical composition of decorticated Hyacinth bean was shown in Table (1). the results indicated that Hyacinth bean contained 28.7 CP, 2.01 CF, 59.07 NFE, 1.7 EE,3.02 ash and 94.5% DM

The result concerning crude protein is in line with that reported by Deka and Sarakr (1990) and Shaaffauses (1963), but disagreed with findings of Shastry and John (1991) who reported 23% crude protein. On the other hand, crude fiber differed from the findings of Deka and Sarkar (1990) and Ealhardallo and Eltinay (1985) who reported higher value of crude fiber ranging from 7.6 to 9.6%, decrease in crude fiber shown in this study may be related due to removal of the coat.

The effect of feeding different levels of decorticated Hyacinth bean on broiler weekly feed consumption is shown in Appendix (4) and Figure (1) and on overall feed intake is given in Table (4). Dietary treatment had significant ($p \leq 0.01$) negative effect on feed intake during the four weeks and this result support the findings of Robinson and Singh (2001). The decreased feed intake associated with increasing dietary levels of Hyacinth bean may be due to decreased palatability induced by the seeds, although the diets were isocaloric and the birds were expected to consume similar feed (Scott *et al.*, 1982).

The effect of dietary treatments on weekly weight gain of broiler is shown in Appendix (5) and Figure (2) and on overall weight gain is shown in table (4). The weight gain was significantly ($p \leq 0.01$) reduced with the increased levels of Hyacinth bean The better weight gain was observed for birds that fed 5% Hyacinth bean compared with birds that fed 10% and 15%. The depression in growth of chicks may be related to anti nutritional factor(s) present in the seeds such as trypsin inhibitors, proteins inhibitors and phytic acid (Islam 2002 and Robinson 2001)

The weekly feed conversion ratio are illustrated in Appendix (6) and overall feed conversion ratio shown in Table (4) Inclusion of Hyacinth bean had significant effect ($P \leq 0.05$) on FCR. The worst feed consumption was observed in feeding high level of Hyacinth bean to broiler. This effect may be related to some toxic effect of bean (Islam, 2002; and Robsion, 2001).

The result of blood parameters and bone ash illustrated in Table (5). The treatments had no significant effect ($P>0.05$) on serum calcium and total protein. However, inorganic phosphorus was significantly affected ($P \leq 0.01$) by dietary treatment, it was low for birds fed 10 and 15% Hyacinth bean.

Table (4) The Effect of dietary decorticated Hyacinth bean on overall performance of broiler chicks (0 - 4 weeks)

	Hyacinth bean level (%)				
parameters	0	5	10	15	SE
Total feed intake (g/bird)	1392.75^{a}	1079.310^{b}	708.62^{c}	617.18^{d}	27.23
Total weight gain (g/bird)	816.24^{a}	556.72^{b}	319.68^{c}	242.61^{d}	19.46
FCR	1.71^{c}	1.93^{c}	2.23^{b}	2.56^{a}	0.089

a-b-c-d : values within the same raw with different superscripts are significantly different ($p \leq 0.05$)

S.E: Standard Error of the mean

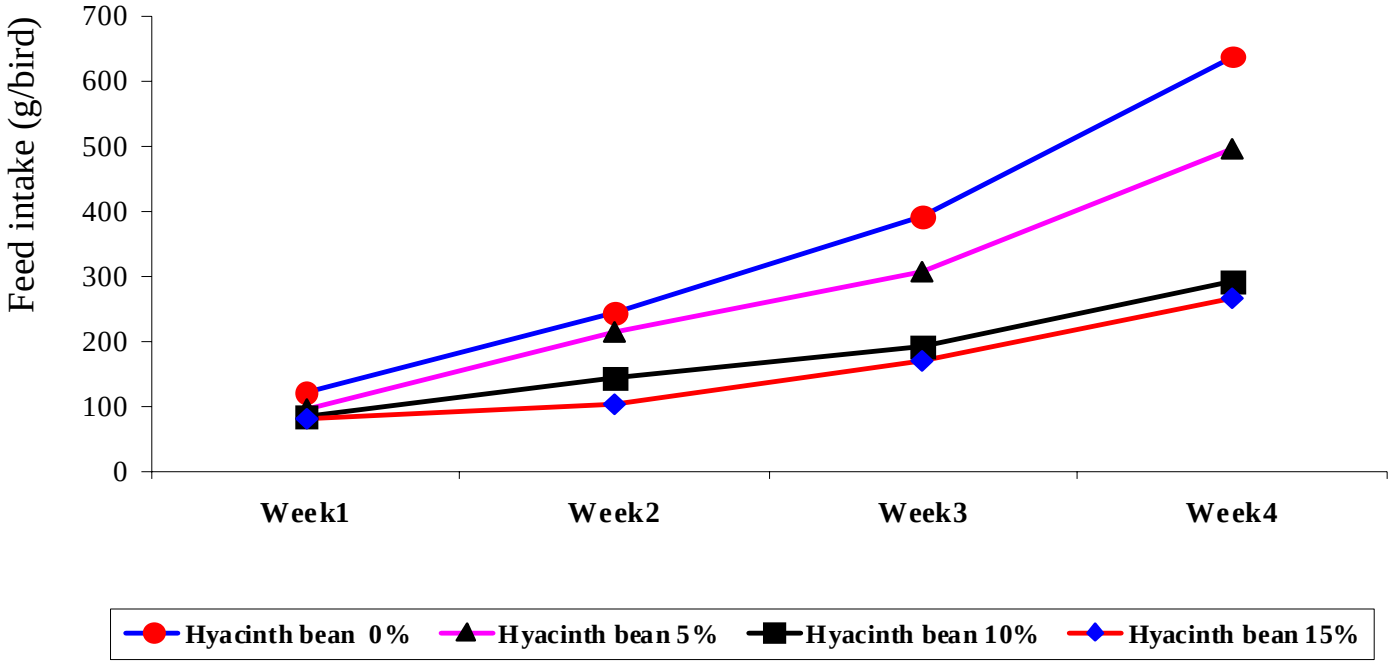

Fig (1): Effect of dietary Hyacinth Bean on weekly feed intake of broiler chicks (g/bird).

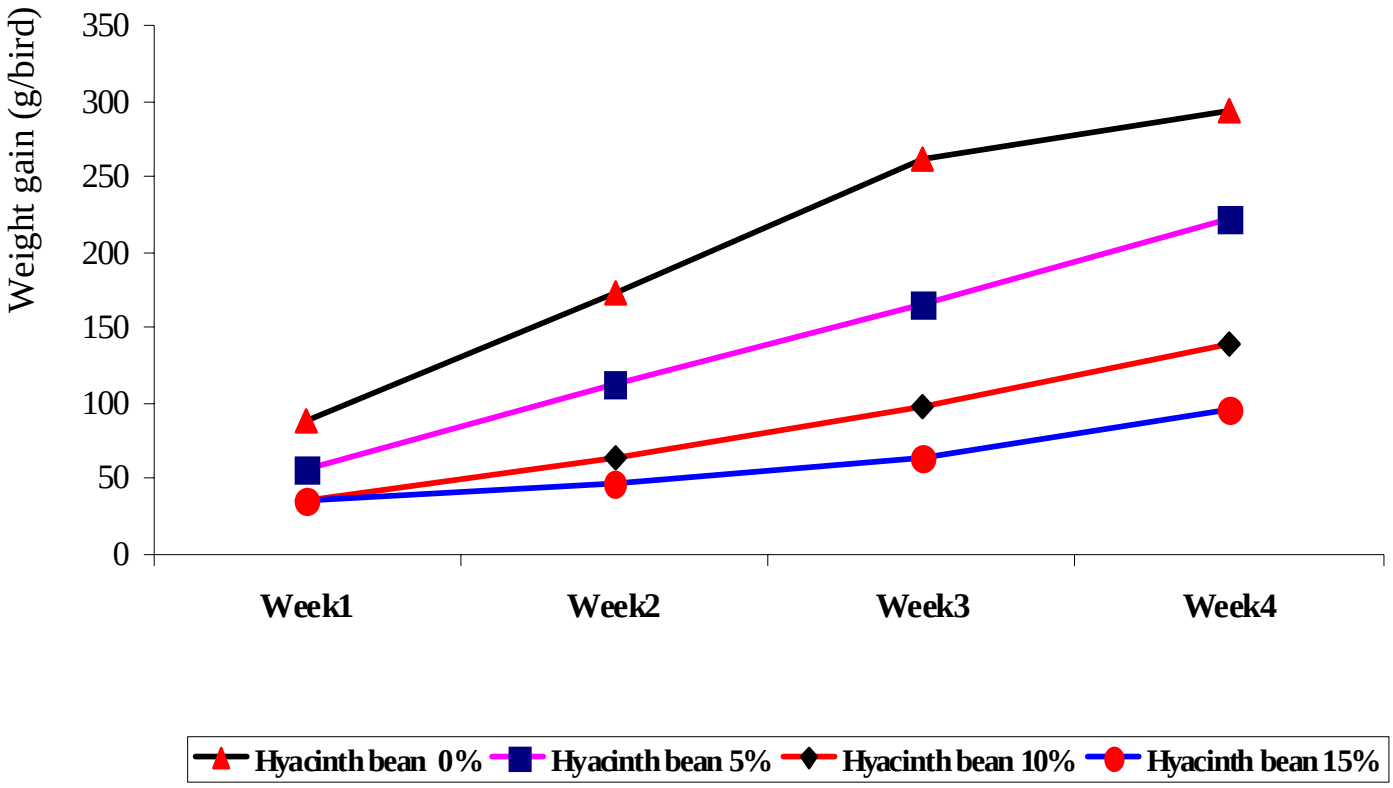

Fig (2): Effect of dietary Hyacinth Bean on weekly weight gain of broiler chicks (g/bird).

Supplementation of Hyacinth bean in diets had significantly ($P<0.01$) decreased bone ash, for birds fed 10 and 15% when compared with 0 and 5%. The results of low inorganic phosphorus and bone ash may be related to the presence of phytic acid in Hyacinth bean that render to availability of phosphate resulting in rickets (Scott *et al.*, 1982)

Thus Rickets occurred in 12.5% in the birds fed 10 and 15 % Hyacinth bean and this could be associated with low bone ash and low inorganic phosphorous .

The results of weekly feed intake during recovery period are shown in appendix (7) and figure (3). In the fifth and sixth weeks of age feed consumption was significantly ($P< 0.01$, $P < 0.05$) reduced for birds that previously fed Hyacinth bean. However, overall feed consumption of birds fed 5% Hyacinth bean was similar to that of control. In the seventh week, birds fed control diet showed similar feed intake. This may be related to palatability of control diet compared with Hyacinth bean diets.

At the recovery period on weekly weight gain showed in appendix (8) and figure (4).birds fed the control diet had significantly ($P <0.01$) decreased weight gain in fifth week. However, the treatments had no significant effect in sixth and seventh weeks. This result may be related to increase in feed intake and reduction of effect of anti nutritional factors that present in Hyacinth Bean.

Furthermore the Feed conversion ration (FCR) and dressing percent treatment had no significance ($p > 0.05$) in the recovery period.

Table (5) Effect of dietary Hyacinth bean on serum composition (Total Protein, Calcium, Phosphorus(Pi)) and Bone ash

	Hyacinth Bean Level (%)				
Parameters	0	5	10	15	SE
Total Protein(g/100 ml)	3.00 [b]	3.08 [ab]	3.25 [a]	3.48 [a]	0.10
Calcium(mg/100ml)	10.20	10.99	12.28	11.15	1.14
(Pi) (mg/100ml)	5.03 [a]	5.78 [a]	4.67 [b]	4.69 [b]	0.22
Bone ash (%)	55.81[a]	53.87 [a]	44.23 [b]	44.89 [b]	1.95
Rickets occurrence %	0	0	12.5	12.5	-

a-b: value within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E: Standard Error of the mean

Pi: inorganic Phosphorus.

ATable 2.6. The overall performance value of the recovery period on broiler chicks (5 – 7 weeks)

	Hyacinth bean level (%)				
parameters	0	5	10	15	SE
Total feed intake (g/bird)	3103.78^{a}	2808.82^{a}	2357.18^{b}	2234.70^{c}	112.99
Total weight gain (g/bird)	1503.41^{a}	1242.02^{ab}	1191.32^{b}	1055.35^{b}	93.93
FCR	2.09	2.27	2.00	2.19	0.17
Dressing %	64.54	66.14	62.70	65.15	1.05

a-b -: value within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E : Standard Error of the mean.

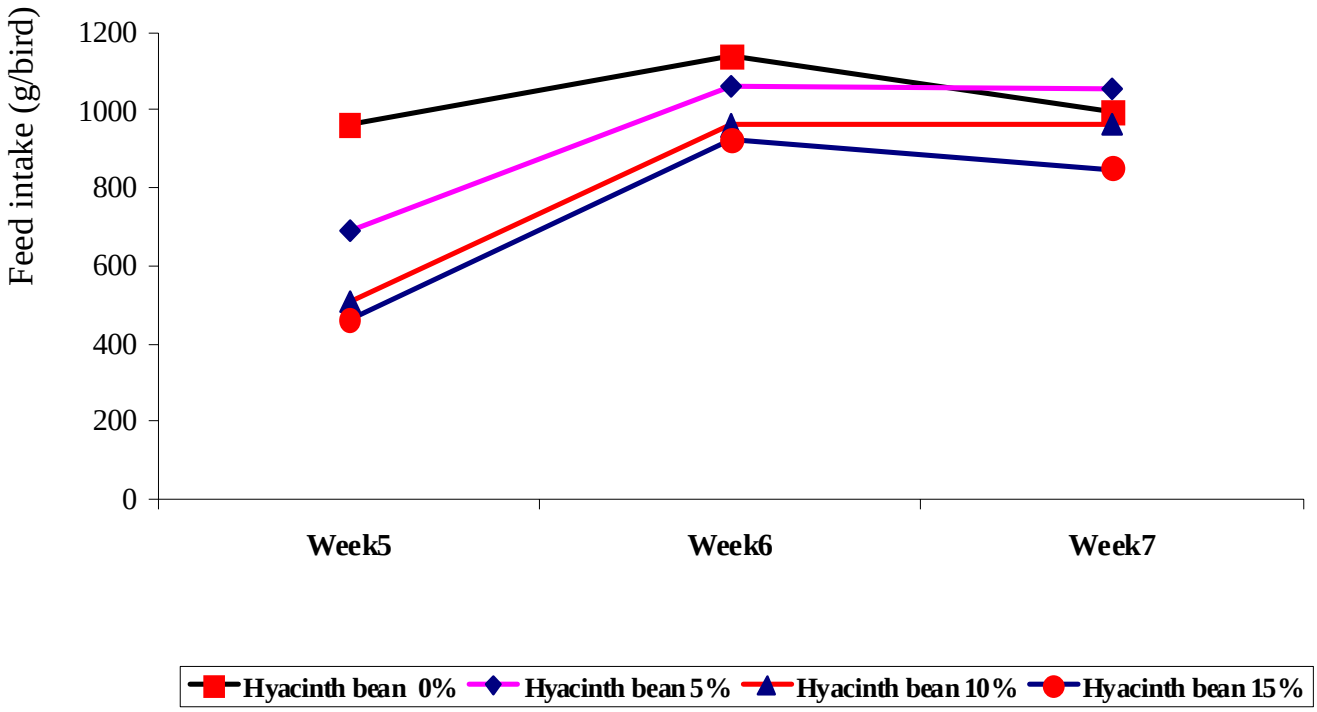

Fig (3): Effect of recovery diet on weekly feed intake of broiler chicks (g/bird)

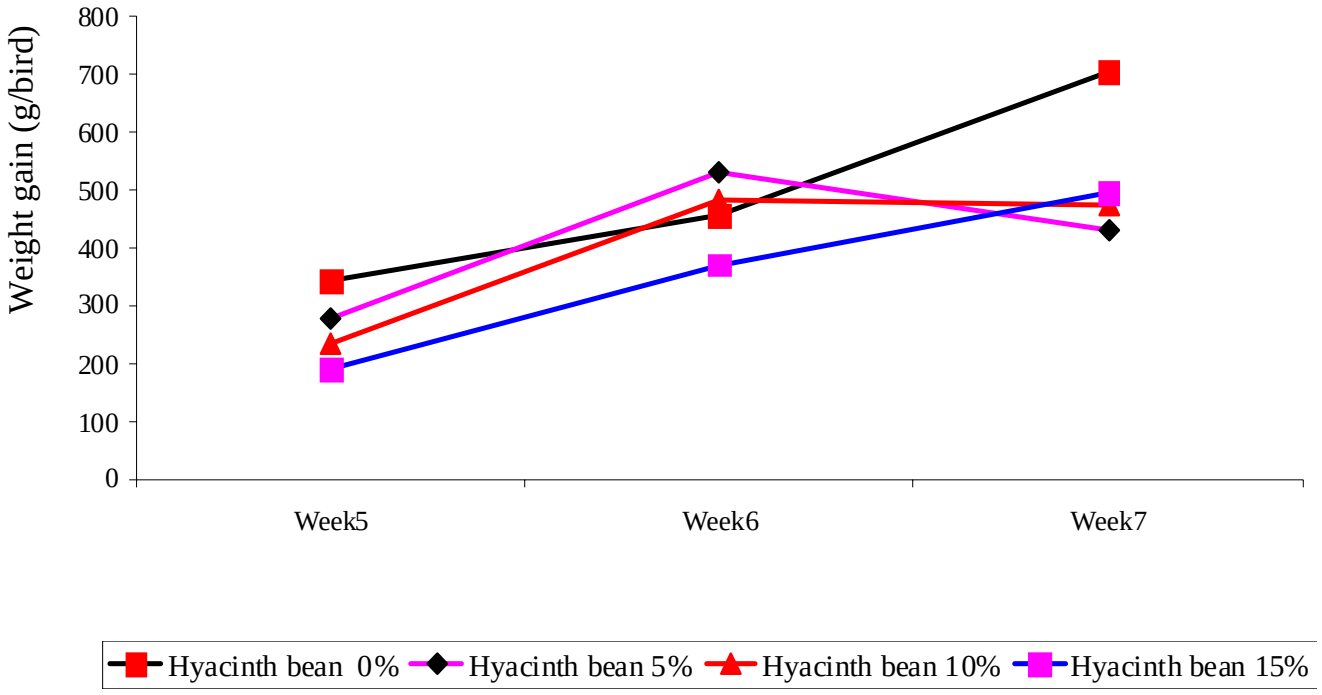

Fig (4): Effect of recovery diet on weekly weight gain of broiler chicks (g/bird)

CONCLUSION AND RECOMMENDATION

- The chemical composition of decorticated Hyacinth bean revealed that it contained 28.7% crude protein, 2.018% crude fiber, 59.07% nitrogen free extract, 1.7% ether extract, 3.02% ash and 94.5% DM and also contained 0.06 tannins and 0.45 trypsin inhibitor.
- Chicks can tolerate up to 5% Hyacinth bean.
- Rickets occur in chicks fed 10 and 15% Hyacinth bean, improvement of chicks performance after supplementation with control diet during (5 - 7weeks).
- Further study is suggested to use different processing methods e.g. (Heat treatment, soaking) for seed to inactivate the antinutritional factor(s).

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APPENDICES

Appendix (1): Metabolizable energy value for poultry

Metabolizable energy value for poultry ME (P) as calculated from the equation of Lodhi et al (1970). Available carbohydrate in this equation assumed to be 80 % of the found NFH value.

The equation thus becomes :

ME (P) =1.549 +0.0102 cp +0.0275 oil +0.0145 NFE -0.0034 CF.

Appendix (2): Chemical analysis of serum total protein:

Serum total protein was measured by the Biuret method as described by Weishelbaum (1946). The principle of the method is based on the reaction of Protein with cooper sulphate in the presence of sodium hydroxide. the Rochelle salt (K-Na-tartrate) contained in the Biuret reagent is utilized to keep the formed cupric hydroxide in solution which gives the blue color. Changes in the scale reading of the coring-Keel specter (Karl Kob Scientific Technical Supplies D.6072,Dreich,West Germany) at was length 545 nm were recorded and values calculated in g/100 ml as follows :

$$\text{Concentration of total protein (g/100 ml)} = \frac{\text{Sample x standard conc.}}{\text{Standard}}$$

Standard conc. = 6 g/100ml.

Appendix (3): Chemical analysis of serum calcium

Serum calcium was measured by the method described by Tinder, (1960).

Test:

Ina centrifuge tube put 0.5 ml serum and 1.0 ml of chloranilic acid.

Standard:

0.5 ml working standard and 1.0 ml of chloranilic acid .stand 15 Minutes and centrifuge 10 minutes .Decart supernant and drain tubes on clean filter paper, wash precipitate with 0.5 ml D .W, centrifuge 5 minutesand drain ,dissolve the precipitate in 4ml of 4% , stand for 5 minutes read at 500 blank ferric nitrate.

$$\text{Calculation} = \frac{\text{A sample} \times 100 \quad \text{mg/100 ml}}{\text{Standard}}$$

Appendix (4): Effect of decorticated dietary Hyacinth bean on weekly feed intake of broiler chickens (g/bird):-

	Hyacinth bean levels				
week	control	5%	10%	15%	SE
1	120.25^{a}	94.56^{b}	82.81^{bc}	79.68^{c}	4.5
2	241.87^{a}	213.12^{a}	142.18^{b}	101.56^{b}	14.35
3	392.81^{a}	306.25^{b}	190.62^{c}	170.31^{c}	12.91
4	637.81^{a}	495.62^{b}	293.00^{c}	265.62^{c}	11.68

A-b-c: Values within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E Standard Error of the mean.

Appendix (5): Effect of dietary decorticated Hyacinth bean on weekly weight gain of Broiler chicks (g/bird):-

	Hyacinth bean level %				
Week	0	5	10	15	S E
1	89.07^{a}	56.25^{b}	35.93^{c}	35.93^{c}	4.96
2	172.31^{a}	112.50^{b}	64.82^{c}	46.87^{d}	5.70
3	261.93^{a}	165.50^{b}	97.74^{c}	64.18^{c}	10.58
4	292.91^{a}	222.47^{b}	139.18^{c}	95.61^{c}	16.13

A-b-c: Values within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E Standard Error of the mean.

Appendix (6): Effect of decorticated dietary Hyacinth bean on weekly FCR of Broiler chicks (g/bird):-

	Hyacinth bean level %				
Week	0	5	10	15	S E
1	1.36^{b}	1.72^{ab}	2.42^{a}	2.26^{a}	0.234
2	1.41^{b}	1.88^{b}	2.32^{ab}	2.15^{a}	0.277
3	1.50^{c}	1.87^{bc}	2.47^{ab}	2.72^{a}	0.119
4	2.1 2	2.12	2.186	2.85	0.228

A-b-c: Values within the same raw with different superscripts are
significantly different ($p \leq 0.05$).
S.E Standard Error of the mean.

Appendix (7): Effect of recovery period on weekly feed intake on broiler chicks (g/bird):-

Hyacinth bean levels					
week	control	5%	10%	15%	SE
5	963.82[a]	690.66[b]	508.92[c]	460.01[c]	25.58
6	1141.32[a]	1063.06[ab]	960.71[b]	924.55[b]	59.73
7	998.63[a]	1054.27[ab]	962.49[ab]	850.00[b]	50.72

A-b-c: Values within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E Standard Error of the mean.

Appendix (8): Effect of recovery period on weekly weight gain on broiler chicks (g/bird):-

	Hyacinth bean level %				
Week	0	5	10	15	S E
5	344.39[a]	280.09[b]	234.32[bc]	189.96[c]	17.07
6	454.92	531.53	482.75	371.40	57.76
7	704.10[a]	430.40[b]	474.25[b]	494.18[ab]	70.91

A-b-c-d: values within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E: Standard Error of the mean.

Appendix (9): Effect of recovery period on weekly F C R on broiler chicks (g/bird):-

	Hyacinth bean level %				
Week	0	5	10	15	S E
5	2.825	2.46	2.20	2.56	0.236
6	2.55	2.019	1.86	3.05	0.439
7	1.55^{b}	1.79^{a}	2.09a	2.53^{ab}	0.260

a-b-c : value within the same raw with different superscripts are significantly different ($p \leq 0.05$).

S.E: Standard Error of the mean.