Online Journal of Animal and Feed Research

Volume 5, Issue 6: 181-188 ; Nov 25, 2015

ISSN 2228-7701

EFFECT OF DIETARY HYACINTH BEANS (*Lablab purpureus*) AND ENZYME ADDITIVES ON PERFORMANCE OF BROILERS

Husham Ismail RAGAB [1*], Khadiga Abbas ABDEL-ATTI[2], Mutaz Saeed BABIKER[3], and Salah Mohammed ELAWAD[4]

[1]*Department of Poultry Production, Faculty of Animal Production, University of Khartoum, Sudan*
[2]*Department of Animal Nutrition, Faculty of Animal Production, University of Khartoum, Sudan*
[3]*Department of Poultry Production, Faculty of Animal Production, University of Gezira, Sudan*
[4]*Department of Agricultural Economics, Faculty of Agriculture, University of Khartoum, Postal code 13314, Khartoum North, Sudan*
*Email: hushamsd7@gmail.com

ABSTRACT: The study was conducted to assess the effect of Hyacinth beans on the performance of broilers, for a period of 47 day feeding trial. In addition to basal control (A), another treatment diets were formulated to have Hyacinth beans at 15% (B, C) without or with enzyme additives and 20% (D, E) without or with enzyme additives. A total of 150 unsexed Ross 308 chicks were randomly distributed to 5 dietary treatments, with 5 replicates (6 birds per rep) Feed and water were offered *ad- libitum.* Results illustrated that, feed intake ($P \leq 0.01$), weight gain ($P \leq 0.01$), FCR ($P \leq 0.05$), PER ($P \leq 0.01$) and dressing percentages ($P \leq 0.01$) were negatively affected by Hyacinth beans inclusion levels (15%, 20%). Neither the processing method practiced for Hyacinth beans nor the enzyme additives were able to improve the performance of broilers better than or comparable to that of basal control broiler diet. The results as well revealed that, treatment diets of 15% Hyacinth beans displayed better performance than 20% level for all of the parameters measured including the dressing percentages and internal organs relative weight.

ORIGINAL ARTICLE
pii: S222877011500030-5
Received 04 Oct. 2015
Accepted 05 Nov. 2015

Keywords: Hyacinth Beans, Processing, Broilers Performance

INTRODUCTION

The cost of feed concentrates for livestock is increasing The Organization for Economic Co-operation and Development (OECD and FAO, 2010), and the unavailability and scarcity of animal origin protein in adequate quantities, makes the use of protein rich legumes to be essential alternatives in poultry nutrition (Akanji, 2002). Legumes beans could be an important source of proteins for countries having short supplies of animal proteins. However, due to high competition and demands for these sources of protein rich legumes, specially, groundnut cake (GNC) and soybean meal (SBM), unfortunately, conventional sources have become in short supply and oftentimes unavailable. That is, therefore, call for adoption of some new unconventional feed ingredients which have comparable nutrients potential as the conventional ones. Hyacinth beans which is a leguminous plant is not eaten very frequently by human, thus, has the potential to become an important protein source for animals. But legume beans, including Hyacinth beans, may contain many anti-nutritional factors, such as haemagglutinin, trypsin inhibitors, saponins, phytic acids, tannins, alkaloids and polyphenolic compounds that could impart negative effects on digestion and performance (Huisman, 1995; Beric et al., 1997). Different processing facilities as soaking, boiling, roasting, germination and fermentation are commonly practiced to alleviate the negative effects of these anti-nutritional factors (Kperegbeyi and Onwumere, 2007; Ani and Adiegwu, 2005). Further reports showed that, the availability of sulphur amino acids (SAA) was - 18.6% in raw beans and about 40-68% in thermally processed beans (Wu et al., 1996).

Mostly, grain legumes were shown to contain relative concentrations of non-starch polysaccharides (NSP) which are resistant to endogenous enzyme digestion in the alimentary tract (Choct et al., 1996; Choct, 1997). Therefore, enzyme mixture supplements which can digest (NSP) are likely to increase the metabolizable energy and protein values of grain legumes (Hew et al., 1995). The use of supplementary enzymes in lupin diets for poultry has met with varying degrees of success in improving animal performance and nutrient utilization (Brenes et al., 1993a, 2002).

The objective of this work is to investigate the influence of intensively processed two levels of Hyacinth beans and dietary enzyme enhancement on the performance of broilers.

To cite this paper: Ragab HI, Abdel-Atti KhA, Babiker MS, Elawad SM. 2015. Effect of dietary Hyacinth beans (*Lablab purpureus*) and enzyme additives on performance of broilers. *Online J. Anim. Feed Res*., 5(6): 181-188.
Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir

MATERIALS AND METHODS

Site and Housing

The experiment was carried out in the Faculty of Veterinary Medicine University of Khartoum. In an open sided housing system, a twenty-five pens of about 100 cm width and length and 90 cm height, were constructed for the experiment of iron posts and wire netting. Five inch thick layer of dry wood shavings was laid as bedding material.

Experimental birds and Duration

One hundred and fifty unsexed day old chicks (Ross 308) were randomly selected out of 500. Chicks were purchased from Coral Company after having been vaccinated against Marek's disease. Twenty five groups of six chicks each, of approximately comparable weights were randomly distributed to five dietary treatments, hence, each treatment included five replicate, (30 birds per treatment). During the first four days adaptation, chicks were fed *ad libitum* on basal diet. Then the five experimental diets were randomly assigned to the experimental units, where chicks were fed on treatment diets for six weeks (5^{th} - 47^{th} day-old). Chicks were vaccinated against Gumboro at 14, 20, and 26 days old and against Newcastle disease at 7^{th} and 20^{th} day old.

Hyacinth beans processing

Hyacinth beans were firstly cleaned, mixed, submerged in water in 200 liter capacity plastic container for 48 hour with seeds to water ratio of 1/10 (w/v), and then boiled for 30 min. Water change was every 24 h and before boiling process. Thereafter, grains were sun dried for 72 h and milled to particle size of I mm. Hyacinth beans were then analyzed for proximate composition according to the standardized method VDLUFA 4th Ed. (Naumann et al., 2004). It was reported by Osman (2007), that soaking and cooking of presoaked Hyacinth beans has a good potential for improving the nutritional value by the reduction it caused in anti-nutritional factors.

Experimental diets

Five isocaloric and isonitrogenous experimental diets were made ready to meet the requirements of broilers as stated by (NRC, 1994). In addition to basal control diet (A) without Hyacinth beans, four experimental diets were composed to contain (150g/kg) and (200g/kg) of the processed Hyacinth beans, either with or without enzymes additives as follow:

1. Diet (A) Control, neither containing Hyacinth beans nor enzyme.
2. Diet (B) contains 150 g/kg of Hyacinth beans without enzyme.
3. Diet (C) contains 150 g/kg of Hyacinth beans with enzyme.
4. Diet (D) contains 200 g/kg of Hyacinth beans without enzyme.
5. Diet (E): contains 200 g/kg of Hyacinth beans with enzyme.

Dietary ingredients including Hyacinth beans of the Rongai type (brown in color) were purchased from the local market and veterinary centers. The enzyme (BERGAZYM^{0} P) which was used as additive, is a multi-enzyme with a high content of pentosanase, contains Endo-1, 4-ß-Xylanase, with 6.000 in EPU/g(= Endo Pentosanase Units), also it has side activities as Cellulase, Alpha-Amylase, Protease and Hemicellulase.

Proximate composition of raw and presoaked boiled Hyacinth beans is illustrated in Table 1, percent composition of dietary ingredients, calculated and determined analysis of the experimental diets according to AOAC (1990) are presented in Table 2. On weekly basis, average feed intake and live body weight for all treatment groups were measured using a digital electronic balance. Then data records were taken for feed intake, weight gain, feed conversion ratio (F.C.R), protein efficiency ratio (P.E.R) and mortality rate. The technical efficiency of Hyacinth beans treatment diets (15 & 20) [(B&C)&(D&E)] % without or with enzyme additives was calculated as percentages of feed consumption and carcasses weight of the control dietary group (A). Samples of birds per treatments (15 birds/ treatment) by ending the experiment were individually weighed and killed by cervical dislocation, and weights of carcasses and some of the internal organs were recorded for computing dressing and relative weights of internal organs.

Table 1 - Proximate Composition of Raw and Processed Hyacinth beans (% DM).

Composition	Raw Hyacinth beans	Soaked and Boiled Hyacinth beans
Dry matter[1,2]	93.30	88.90
Crude protein (CP)[1]	23.40	25.70
Ash[1]	3.73	2.20
Ether extract (EE)[3]	0.92	2.12
Crude fiber (CF)[3]	10.20	11.50
NFE [4]	61.80	58.50

[1]Values are averages of three determinations, [2]DM on fresh basis, [3]Values are averages of two determinations, [4]Values are calculated by difference as following: NFE = 100 – (Moisture+ Ash + CP + EE +CF)

To cite this paper: Ragab HI, Abdel-Atti KhA, Babiker MS, Elawad SM. 2015. Effect of dietary Hyacinth beans (*Lablab purpureus*) and enzyme additives on performance of broilers. *Online J. Anim. Feed Res*., 5(6): 181-188.
Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir

Table 2 - Composition of experimental diets containing processed Hyacinth beans					
Treatments / Ingredient	Hyacinth beans, %				
	0 (A)	15 (B)	15 (C)	20 (D)	20 (E)
	Enzyme (mg/kg)				
	0	0	25	0	25
Sorghum	54.25	52.80	52.80	45.20	45.20
Groundnut cake	23.00	17.21	17.21	17.64	17.64
Sesame cake	5.58	8.00	8.00	7.59	7.59
Hyacinth beans	0	15	15	20	20
Wheat Bran	7.70	0.00	0.00	0.00	0.00
Super concentrate [1]	5	5	5	5	5
Di- calcium	0.70	0.75	0.75	1.48	1.48
Oyster shell	0.26	0.00	0.00	0.22	0.22
Salt	0.20	0.20	0.20	0.20	0.20
Lysine	0.12	0.03	0.03	0.29	0.29
Methionine	0.09	0.01	0.01	0.18	0.18
Vegetable Oil	2.90	0.80	0.80	2.00	2.00
Vit. + Min[2]	0.20	0.20	0.20	0.20	0.20
Calculated analysis					
ME (Kcal/Kg)	3155.23	3153.94	3153.94	3155.50	3155.50
CP%	22.82	22.81	22.81	22.82	22.82
Crude fibre%	5.14	5.27	5.27	5.60	5.60
Ca%	1.05	0.96	0.96	1.19	1.19
Av. Phosphorus%	0.45	0.44	0.44	0.57	0.57
Lysine%	1.23	1.04	1.04	1.28	1.28
Methionine%	0.51	0.41	0.41	0.57	0.57
Meth. + Cystine	0.77	0.63	0.63	0.78	0.78
Determined analysis					
CP%	23.20	23.10	22.60	22.85	23.50
Crude fibre%	5.10	5.20	5.20	5.25	5.25
EE%	4.50	4.00	4.50	3.00	4.50
Ash%	6.25	7.50	7.35	7.00	6.25
NFE%	56.45	56.20	57.20	58.40	57.00

[1]Supplied the following per kg = 40% CP, 2100 kcal ME, 2% C.F, 10% Ca,4% P, 12% lysine and 3 % methionine. [2]Supplied the following per kg of the diet: Vitamin A15000 IU, Vitamin D_3 3000 IU, Vitamin B_1 2 mg, Vitamin B_2 5.5 mg, Vitamin B_{12} 0.01 mg, D- Calcium pantothenate 10 mg, Vitamin E 5 mg, Vitamin K 3 mg, Niacine 25 mg, Ethoxyquin 10 mg, Manganese oxide 32.26 mg, Cobalt sulphate 0.57 mg, Zinc oxide 2.5 mg and Ferro carbonate 40.64 mg.

Experimental Design and Statistical Analysis

The experiment was conducted following completely randomized design. Data were subjected to analysis of variance according to (Steel and Torrie, 1980). Treatment means were separated using Duncan multiple range test (1989).

RESULTS AND DISCUSSION

The Chemical analysis of raw and processed Hyacinth beans revealed a slight increase in crude protein, fiber and fat content due processing, similar to previous finding by Ragab *et al*. (2010, 2012). The two stage processing method used was based on positive findings previously mentioned by Osman (2007) ,who referred to reduction in Trypsin inhibitor activity of Hyacinth beans by 6.3% due soaking and by 66.7% due cooking. And a decline in phytic acid by soaking for 22.19%, and by cooking for 44.85%.

As illustrated in Tables 3 and 4, birds on control groups consumed the highest ($P \leq 0.01$) feed, whereas those on both of 20% Hyacinth beans diets D&E consumed ($P \leq 0.01$) the lowest feed. The group on enzymic 15% Hyacinth beans (C) consumed more feed ($P \leq 0.01$) than those on non-enzymic 15% Hyacinth beans diet (B). As outlined in Table 5, the overall feed consumption of diets B, C, D and E was lowered by about 19.17%, 13.24%, 33.87% and 36.79% as compared to consumption of control group.

This clear reduction in feed consumption due increasingly Hyacinth beans is in harmony with the finding of Abeke (2008) in Pullets and layers when were fed on Hyacinth beans. Dousa et al. (2011) reported similar feed reduction due feeding on increased levels of legume concentrates. Similar feed reduction due feeding on legumes

To cite this paper: Ragab HI, Abdel-Atti KhA, Babiker MS, Elawad SM. 2015. Effect of dietary Hyacinth beans (*Lablab purpureus*) and enzyme additives on performance of broilers. *Online J. Anim. Feed Res*., 5(6): 181-188.
Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir

beans was previously reported; an example is the high dietary levels of cooked *Mucuna utilis* seed meal as replacement for soya bean meals (Akinmutimi and Okwu, 2006). This reduction was elucidated by the authors to unpalatable residual effect of anti-nutritional factors, which were increasingly accumulated as the dietary level of test feedstuff increased. Furthermore, a reduction in feed consumption was earlier noticed when graded levels (0, 5, 10, 15 and 20) of dietary decorticated *Cajanus. cajan* seeds were fed to broilers (Saeed and khadiga, 2007). Sundu et al. (2008), showed that, a substitution of 10-50% of copra meal (CM) depressed feed intake by about 13% in 30% (CM) diet and by 26% in 50% (CM). Emenalon (2004) remarked a reduction in feed consumption, when graded levels of *Mucuna pruriens* and copra seed meals were fed to broilers as starter. He attributed feed reduction to poisonous residual effect of *Mucuna pruriens*, the bulkiness, and non-starch polysaccharides (NSP) of copra meal. These components are considered to have negative effects on feed intake and digestibility (Naveed *et al.*, 1999).

Table 3 - Overall performance of broilers as affected by the dietary levels of processed Hyacinth beans.

Parameters \ Hyacinth beans %	0	15	15	20	20	SEM
	Enzyme (mg/kg)					
	0(A)	0(B)	25(C)	0(D)	25(E)	
Feed intake (g/bird)	3681.39 [a]	2975.29 [c]	3194.13 [b]	2434.55 [d]	2327.13 [d]	60.35
Live body weight (g/bird)	2108.41 [a]	1567.23 [b]	1611.87 [b]	1162.72 [c]	1037.20 [d]	42.54
Body weight gain (g/bird)	2032.42 [a]	1491.76 [b]	1534.88 [b]	1087.19 [c]	960.80 [d]	42.32
FCR (g feed/g weight gain)	1.81 [c]	2.00 [bc]	2.08 [bc]	2.25 [ab]	2.46 [a]	0.09
PER (g B.Wt gain/g protein consumed)	2.38 [a]	2.17 [b]	2.13 [bc]	1.96 [c]	1.76 [d]	0.06
Mortality (%)	6.80	0.00	3.40	0.00	3.40	2.84

[a, b] Means in the same raw with different superscripts were significantly different; Values are means of 5 replicates, 6 birds each, (n = 30); SEM =standard error of treatment means.

Table 4 - Performance parameters of broilers as affected by dietary levels of processed Hyacinth beans

Item	Live body weight (g)	Feed intake (g)	Body weight gain (g)	FCR (g feed/g weight gain)	PER (g weight gain/g protein consumed)
Hyacinth beans					
15%	1589.55 [a]	3084.71 [a]	1513.32 [a]	2.04 [b]	2.15 [a]
20%	1099.96 [b]	2380.84 [b]	1023.99 [b]	2.36 [a]	1.86 [b]
Enzyme					
No enzyme	1364.97	2704.92	1364.97	2.12	2.06
Enzyme	1324.53	2760.63	1247.84	2.27	1.94
Pooled ± SEM	23.33	23.33	23.16	0.05	0.03
Source of variation	Probability				
Hyacinth beans %	0.0001	0.0001	0.0001	0.0001	0.0001
Enzyme	0.399	0.406	0.382	0.176	0.102
H.beans% × enzyme	0.087	0.024	0.086	0.553	0.286

[a, b] Means in the same column with different superscripts were significantly different; Values are means of 5 replicates, 6 birds each, (n = 30); SEM =standard error of treatment means.

The significant increase in overall feed intake of enzymic (15%) Hyacinth bean was noticeable; it was contrary to that of enzymic 20% Hyacinth beans. Enzymes were known to improve the feeding value of feedstuffs, and their action might be affected by many factors, including environment, the amount of enzyme in the reaction and the interactions between enzymes and other substances (Choct, 1996; Kumar et al., 1997).

Control group A achieved the distinguished weight gain ($P \leq 0.01$), whereas, the lowest ($P \leq 0.01$) one was for both of 20% Hyacinth beans groups D&E. Birds on 15% Hyacinth beans diets B&C showed non-significant ($P \geq 0.05$) difference to each other for overall weight gain and final body weight.

The inferiority viewed for weight gain as the dietary level of Hyacinth beans raised, could be attributed to several reasons as; the reduction in feed intake due to residual toxic components affecting palatability (Aletor, 1997). Tannins are known to bind dietary proteins and digestive enzymes into complexes, which are then not

To cite this paper: Ragab HI, Abdel-Atti KhA, Babiker MS, Elawad SM. 2015. Effect of dietary Hyacinth beans (*Lablab purpureus*) and enzyme additives on performance of broilers. *Online J. Anim. Feed Res.*, 5(6): 181-188.
Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir

readily digestible (Melansho et al., 1987). Phytin as well is thought to chelate certain macro and micro minerals; it can form complexes with divalent cations, thereby reducing bioavailability of Ca, Cu, Fe, Mg and Zn (Smith and Annison, 1996). This in turn might distress different metabolism processes due to minerals lack, resulting in a consequential growth depression (Aletor and Fasuyi, 1997).

Cyanide detoxification route, particularly in monogastrics is through Cyanide Thiocyanate sulphur-transferase (Rhodenase pathway) which requires organic sulphur donors in the form of Methionine and Cysteine. This precipitate methionine deficiency in an otherwise balanced diet (Aletor and Fasuyi, 1997); it might be this deficiency which resulted in poor growth rate. One or combined reasons from the above-mentioned ones might have negatively led to the depressing performance of broilers fed on the processed Hyacinth beans diets.

Birds on control diet A demonstrated the best FCR, whereas, birds on 20% Hyacinth beans diet (D&E) exhibited the poorest FCR. The inability of Hyacinth beans treatments to express similar FCR as shown for control group could be attributed to low feed consumption or low digestibility of these diets. It was stated by McDonald et al. (1994), that better utilization of feeds (FCR) depends on its digestibility, which rely mainly on its chemical composition.

Enzyme additives at 20 % Hyacinth beans failed to modify FCR. The effect might be explained on basis of low feed utilization at 20 % level, due to decreased digestibility caused mainly by increased cumulative residual effect of anti-nutritional factors (ANFs), as reported earlier with soybeans by Scott et al. (1976). Concerning overall protein efficiency ratio PER, birds on control diet A, achieved the best PER ($P \leq 0.01$) compared with Hyacinth beans treatment groups B, C, D and E. The lowest PER was recorded for the group on enzymic 20% Hyacinth beans diet E. Low values of PER with increased Hyacinth beans levels could be interpreted, as reported earlier by (Emenalon et al., 2007; Ani and Omeje, 2007). Those authors showed that, toxic components, mainly anti-trypsin and chymotrypsins inhibit protein and energy utilization of birds. They are protease inhibitors, in the efficient utilization of legumes proteins.

There was no significant ($P \geq 0.05$) difference in mortality rate between treatment groups. Similarly as the results with Hyacinth beans obtained by Abeke et al. (2008), which refer to lack of serious health hazards due feeding on treatments, an indication of somewhat appropriate processing of 30 minutes boiling at 100°C to the 48 hour soaked Hyacinth beans.

Table 5 - Technical efficiency of feeding broilers on dietary levels of processed Hyacinth beans

Treatment	Overall feed consumption (g)	Feed consumption technical efficiency (%)	Carcasses weight (g)	Carcasses weight technical efficiency (%)
A(standard)	3681.39 ^{a}	100 %	1614.86 ^{a}	100%
B	2975.29 ^{c}	80.83%	1235.39 ^{b}	76.50
C	3194.13 ^{b}	86.76%	1240.42 ^{b}	76.81
D	2434.55 ^{d}	66.13%	958.70 ^{c}	59.37
E	2327.13 ^{d}	63.21%	857.19 ^{c}	53.08
SEM	±60.35	–	±40.69	–

^{a,b} Means in the same column with different superscripts were significantly different; Values are means of 5 replicates, 6 bids each, (n = 30); SEM =standard error of treatment means.

Table 6 - Effect of dietary levels of processed Hyacinth beans on dressing percentages and internal organs relative weights of broilers.

Hyacinth beans % / Parameters	0	15	15	20	20	
	Enzyme (mg/kg)					
	0	0	25	0	25	
	(A)	(B)	(C)	(D)	(E)	
Dressing %	75.88 ^{a}	69.47 ^{b}	70.52 ^{b}	66.56 ^{c}	65.78 ^{c}	0.90
Viscera %	10.19 ^{c}	13.50 ^{b}	13.09 ^{b}	16.32 ^{a}	16.56 ^{a}	0.53
Heart %	0.41 ^{c}	0.46 ^{bc}	0.42 ^{c}	0.49 ^{ab}	0.52 ^{a}	0.02
Liver %	1.97 ^{b}	2.28 ^{ab}	2.15 ^{ab}	2.48 ^{a}	2.44 ^{ab}	0.15
Gizzard+ Proventriculus %	3.67 ^{b}	3.96 ^{b}	3.92 ^{b}	4.78 ^{a}	5.02 ^{a}	0.22
Pancreas %	0.19 ^{c}	0.29 ^{b}	0.29 ^{b}	0.34 ^{a}	0.35 ^{a}	0.02

^{a,b} Means in the same raw with different superscripts were significantly different; Values are means of 15 bird samples (n = 15); SEM =standard error of treatment means.

To cite this paper: Ragab HI, Abdel-Atti KhA, Babiker MS, Elawad SM. 2015. Effect of dietary Hyacinth beans (*Lablab purpureus*) and enzyme additives on performance of broilers. *Online J. Anim. Feed Res.*, 5(6): 181-188.
Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir

Table 7 - Effect of dietary levels of processed Hyacinth beans on dressing percentages and internal organs relative weights of broilers.

Item	Dressing (%)	Viscera (%)	Heart (%)	Liver (%)	Gizzard+ Proventriculus (%)	Pancreas (%)
Hyacinth beans						
15%	70.00 [a]	13.30 [b]	0.44 [b]	2.21 [b]	3.94 [b]	0.29 [b]
20%	66.17 [b]	16.44 [a]	0.50 [a]	2.46 [a]	4.90 [a]	0.35 [a]
Enzyme						
No enzyme	68.02	14.91	0.47	2.38	4.37	0.31
Enzyme	68.15	14.83	0.47	2.30	4.47	0.32
Pooled SEM	0.45	0.29	0.01	0.09	0.12	0.01
Source of variation			**Probability**			
Hyacinth beans level	0.0001	0.0001	0.0001	0.157	0.0001	0.0001
Enzyme	0.883	0.887	0.903	0.605	0.665	0.749
H. Beans× enzyme	0.309	0.576	0.083	0.803	0.559	0.714

[a, b] Means in the same column with different superscripts were significantly different; Values are means of 15 birds samples (n = 15); SEM =standard error of treatment means.

Carcasses and non-carcasses components evaluation

Data for dressing percentage and internal visceral organs relatives' weights is illustrated in Tables 6 and 7. Treatment groups on control diet demonstrated the superiority ($P \leq 0.01$) for dressing percentages. Birds on 20% Hyacinth beans diets D&E showed lower ($P \leq 0.01$) dressing compared to those on 15% diets B&C. As outlined in Table 5; carcasses of B, C, D and E groups when compared to control were lessened by 23.5%, 23.19%, 40.63% and 46.92% respectively.

The low dressing percentages of the Hyacinth beans groups is in parallel to their carcasses and live body weights. The high dressing for control group implies that. Hence, dietary Hyacinth beans were negatively affected the dressing percentage. Regarding viscera relative weights, birds on Hyacinth beans, chiefly 20% level, showed higher viscera relative weights compared to control groups. The same pattern of notable increase was applied as well to pancreas. Lower heart relative weight was noticed with control and both of 15% Hyacinth beans (B&C) groups, oppositely, birds on 20% Hyacinth beans exhibited the highest one. The same remark was witnessed before by Abeke (2008) when another cultivar of Hyacinth beans was fed to broilers.

Birds on all Hyacinth beans treatments showed non-significant ($P \geq 0.05$) difference for lower liver relative weights. Birds on both of 20% Hyacinth beans displayed ($P \leq 0.05$) high relative weight for gizzard plus proventriculus. The high relative weights noticed with Hyacinth beans treatment groups for the internal organs as (pancreas, liver and gizzard plus proventriculus) confirm the interpretation of Omeje (1999) for an occurrence of somewhat hypertrophy and increased weights of internal organs. This was due to their increased activity in the production of proteolytic enzymes, to make-up for reduced availability of proteins and energy from Hyacinth beans, because of the presence of anti-nutritional factors. On the other hand, liver action in detoxifying the inherent toxins may lead to their enlargement. As shown in Table 7, Hyacinth beans level is the major factor ($P \leq 0.01$) which negatively affected internal organs relative weights. Yet no noteworthy effects were traced for enzyme additives or its interaction with Hyacinth beans level.

CONCLUSION

The results obtained confirm the priority of the unconventional groundnut cakes as plant protein source when compared with the studied Hyacinth beans in this work. A search for alternative processing methods or for cultivars of Hyacinth beans fewer in anti-nutrients and better in nutrients profile may contribute to reduce the dependence on the conventional groundnut cake.

REFERNCES

AOAC (1990). Association of Official Analytical Chemists. Official methods of analysis, 15th Edn.,Washington, DC.

Abeke FO, Ogundipe SO, Sekoni AA, Dafwang II, Adeyinka IA, Oni OO and Abeke A (2008). Effect of Dietary Levels of Cooked *Lablab purpureus* Beans on the Performance of Broiler Chickens. American Journal of Food Technology, 3 (1): 42- 49.

Akanji AM (2002). Enhancing the utilisation of some tropical legume seeds in diets of exotic meat type and egg type chickens, Ph.D. Thesis University of Ibadan, Nigeria.

Akinmutimi AH and Okwu ND (2006). Effect of Quantitative Substitution of Cooked *Mucuna utilis* Seed Meal for Soybean Meal in Broiler Finisher Diet. International Journal of Poultry Science, 5: 477- 481.

Aletor VA and Fasuyi AO (1997). Nutrient composition and processing effects on cassava leaf (*Manihot esculenta*, cranzt) anti-nutrients. Proceedings of 2nd annual conference of Animal Science Association of Nigeria. September, 16-17.

Ani AO and Adiegwu LI (2005). The Feeding Value of Velvet beans (*Mucuna pruriens*) to weaker rabbits. Proceeding of 30th Annual Conf. of Nig Soc. of Anim. Prod. (NSAP) 20th-24th March at University of Nigeria Nnsukka, Nigeria, pp: 186-189.

Ani AO and Omeje OD (2007). Effect of supplementation with enzyme on growth performance of broiler chicks fed diets containing raw bambara nut (*Voandzeia subterranean* L.) waste. Proceeding of the 32nd Annual conference of the Nigerian Society of Animal Production (NSAP) Held at the University of Calabar, Nigeria from 18th-21st March, pp: 278-281.

Beric Z, Cerny T, Posavac J and Janjecic Z (1997). Grain legumes in feeding monogastric livestock. Krmiva, 39: 181-190.

Brenes A, Marquardt RR, Guenter W and Rotter BA (1993a). Effect of enzyme supplementation on the nutritional value of raw, autoclaved, and dehulled lupins (*Lupinus albus*) in chicken diets. Poultry Science, 72: 228 -229.

Brenes A, Marquardt RR, Guenter W and Viveros A (2002). Effect of enzyme addition on the performance and gastrointestinal size of chicks fed whole dehulled lupins and lupin hulls diets. Poult. Sci, 81:670–678.

Choct M (1997). Non-starch polysaccharides: chemical structures and nutritional significance. Feed Milling International, 191: 13– 19.

Choct M, Hughes RJ, Wang J, Bedford MR, Morgan AJ and Annison G (1996). Increased small intestinal fermentation is partly responsible for the anti-nutritive activity of non-starch polysaccharides in chickens. British Poultry Science, 37: 609-621.

Dousa BM, Khadiga AA and Elawad SM (2011). Inclusion of Some Raw Legume Grains as Broiler Chicks Concentrates. International Journal of Poultry Science, 10 (5): 393-396.

Duncan DB (1955). Multiple ranges and multiple F-tests. Biometrics 11: 1-42.

Emenalon OO, Chima MC, Etuk EB and Esonu BO (2007). Comparative evaluation of processed velvet bean (*Mucuna pruriens*), Soyabean and groundnut meals on the performance and internal organ characteristics of broilers. Proc. 32nd Ann. Conf. Nig. Soc. Anim. Prod. (NSAP) Held at the University of Calabar, Nigeria from 18th-21st March, Pp: 220-222.

Emenalom OO (2004). Comparative performance of broiler chicks fed diet containing differently processed *Mucuna puriens* seed meals. Nig. J. Anim. Prod, 31: 12-16.

Hew LI, Ravindran V, Mollah Y, Gill RJ and Bryden WL (1995). Enzyme supplementation improves ileal amino acid digestibility values of wheat for broilers. Proceedings of the Australian Poultry Science Symposium, 7: 189.

Huisman J (1995). Aspects of antinutritional factors (ANFs) in relation to nutrition and pollution. Poult. Adv, 28: 57- 66.

Kperegbeyi JI and Onwumere OS (2007). Effects of raw and toasted bambara groundnut (*Vicia subterranean (L.) verdcourt*) on performance of growing cockerels. Proc. 32nd Ann. Conf. Nig. Soc. Anim. Prod. (NSAP) Held at the University of Calabar, Nigeria from 18th- 21st March, pp: 188-191.

Kumar A, Dingle JG, Wiryawan K and Creswell DC (1997). Enzymes for improved nutritional value of layer diets. In: Queensland Poult. Sci. Symp, 6: 1-12. Gatton, the University of Queensland.

MacDonald P, Edwards RA and Greenhalgh JFD (1994). Animal Nutrition. 5th Edn. Longman. Singapore.

Melansho H, Butler LG and Carlson DM (1987). Dietary tannins and salivary proline- rich proteins: interacting induction and defense- Mechanisms. Ann. Rev. Nutr, 7: 423-440.

(NRC) National Research Council (1994). Nutrient requirements of poultry, 9th rev. ed. National Academy Press, Washington, DC.

Naumann C, Bassler R, Seibold R and Barth C (2004). Methodenbuch Band iii, Die chemische Untersuchung von Futtermitteln. 4th ed. Darmstadt: VDLUFA-Verlag.

Naveed A, Camovic TA and Bedford MR (1999). The influence of carbohydrase and protease supplementation on amino acid digestibility of lupin- based diets for broiler chicks. Proc. Austr. Poult. Sci. Symp, 11: 93–96.

Omeje SI (1999). Issues in Animal Science. Raykennedy Scientific Pub. Enugu, Nigeria.

Osman MA (2007). Effect of Different Processing Methodson Nutrient Composition, Antinutrional Factors, and in vitro Protein Digestibility of Dolichos Lablab Bean [*Lablab purpuresus* (L) Sweet]. Pakistan Journal of Nutrition, 6 (4): 299- 303.

The Organisation for Economic Co-operation and Development (OECD) and Food and Agriculture Organization of the United Nations (FAO) (2010). Meat. OECD- FAO Agricultural Outlook 2010. OECD Publishing. Pp. 147–158.

Ragab HI, Kijora C, Abdel Atti KA and Danier J (2010). Effect of Traditional Processing on the Nutritional Value of Some Legumes Seeds Produced in Sudan for Poultry Feeding. International Journal of Poultry Science, 9 (2): 198-204.

Ragab H,I Kijora C, Abdel Atti KA and Ibrahim S (2012). Effect of Different Levels of the Processed *Lablab purpureus* Seeds on Laying Performance, Egg Quality and Serum Parameters. International Journal of Poultry Science, 11 (2): 131-137.

Saeed MS and Abdel Ati KA (2007). Inclusion of Pigeon Pea (*Cajanus cajan*) Seed on Broiler Chick's Diet. Research Journal of Animal and Veterinary Sciences, 2: 1-4.

Scott ML, Sandholm M and Hocksterler HW (1976). Effects of Anti Trypsin and hemagglutinin in soyabean and other feedstuffs upon feed digestion in chickens. Proc. Cornell. Nutr. Conf. Page 22-25.

Smiths CHM and Annison G (1996). Non-starch plant polysaccharides in broiler nutrition - towards a physiologically valid approach to their determination. World's Poultry Science Journal, 52: 203 - 221.

Steel RGD, JH. Torri (1980). Principles and procedures of statistics: A Biometrical Approach.2nd ed. McGraw Hill, Kogakusha Ltd., Tokyo.

Sundu B, Kumar A and Dingle J (2008). The Effect of Proportion of Crumbled Copra Meal and Enzyme Supplementation on Broiler Growth and Gastrointestinal Development. International Journal of Poultry Science, 7 (5): 511-515.

Wu W, Williams WP, Kunkel ME, Acton JC, Huang Y, Wardlaw FB and Grimes LW (1996). Amino acid availability and availability-corrected amino acid score of red kidney beans (*Phaseolus vulgaris* L.). Journal of Agricultural and Food Chemistry, 44: 1296 - 1301.

To cite this paper: Ragab HI, Abdel-Atti KhA, Babiker MS, Elawad SM. 2015. Effect of dietary Hyacinth beans (*Lablab purpureus*) and enzyme additives on performance of broilers. *Online J. Anim. Feed Res*., 5(6): 181-188.
Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir