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NUTRITIONAL EVALUATION OF MUNGBEAN SEEDS (*Vigna radiate*) IN BROILER DIETS

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ABSTRACT

This study aimed to investigate the nutritional value of new variety (Kawmi-1) of mungbean seeds (MBS) as an alternative protein source in poultry diets. The chemical analysis included nutrients composition and essential amino acids content. Chemical score (CS) and essential amino acids index (EAAI) values were calculated from the amino acids pattern. Total protein efficiency (TPE) determination was carried out as a biological method to evaluate protein quality.

The results of proximate analysis recorded values of: 9.53 % Moisture, 25% CP, 1.53% EE, 3.01 % CF, 3.06% Ash, 0.14% Ca, 0.59% P and 57.87% NFE. Mungbean seeds (MBS) protein appeared to have balanced essential amino acids pattern. The chemical score value indicated that the first limiting amino acid was methionine. EAAI for MBS protein recorded 64.3 % calculated based on whole egg protein. TPE value for MBS was improved significantly ($p<0.05$) by adding complementary level of methionine to achieve SBM with no significant difference (2.28 vs. 2.29 for “MBS+methionine” and SBM treatments, respectively). It could be concluded that MBS is a promising poultry feedstuff as an alternative source of protein.

To evaluate the effect of feeding diets comprise different levels of mungbean seeds at expense of soybean meal protein on growth performance of broiler chicks, two hundreds and forty day-old Arbor-Acres broiler chicks were randomly divided into four experimental treatment groups with three replicates each. The different experimental diets including 0, 20, 30, and 40 % MBS at expense of soybean meal protein were maintained iso-nutritive.

At the end of 28 days of age, weight gain and feed conversion values of chicks fed MBS diets were approximately similar to those recorded by chicks fed control diet. At the end of experiment (7 weeks), the values of weight gain, feed conversion, protein and energy utilization and performance index of birds fed the MBS diets had also no significant differences compared to those fed the control diet.

Accordingly, it could be concluded that mungbean seeds could be used safely in broiler diets as promising source of plant protein up to 40% of soybean protein.

Keywords: broilers, mungbean seeds, soybean meal, protein evaluation, growth Performance.

INTRODUCTION

Feeding cost for poultry is considered the most expensive item since it represents about 60-65 % of the total costs (Scott *et al*., 1976). Many attempts have been made to decrease the cost of feeding to the minimum level. These attempts include replacing the expensive feedstuffs by other local feed ingredients. The high prices and limited quantities of protein sources available for using in poultry feeds have resulted in attempts to replace dietary soybean meal protein by some untraditional plant protein sources.

Mungbean (*Vigna radiate*) is a short summer crop cultivated in many parts of the world. It is the most important grain legume in some Asian countries (Khalaf Allah, 1995) where it is very popular human food because of its high digestibility and relative freedom from the flatulence effect commonly associated with many grain legumes.

Chemical composition of mungbean seeds (MBS) for major components and amino acids were carried out by some workers (Hussein, 1989, Mehta *et al*., 1993 and Rosalah *et al*., 1993). Mungbean seeds contain favourable amounts of protein, essential amino acids, minerals, vitamins, and energy (Khalaf Allah, 1995; Iqtidar and Saleem, 1995; El- Damhougy *et al*., 1996, Khalil, 1996 and El- Alfy, 1998), beside its lower content of anti- nutritional factors (Creswell, 1981 and Chitra *et al*., 1995). For this reason, several workers have used MBS as a feed ingredient for poultry (Creswell, 1981; Yamazaki *et al*., 1988, and El-Alfy, 1998). However, there is little information in the literature on evaluating the biological value of MBS as a source of protein in poultry diets.

Therefore , this study aimed to evaluate a new variety (Kowmi-1) of MBS as an alternative source of protein in poultry diets and studying its effect on growth performance of broiler chicks .

MATERIALS AND METHODS

The present study was carried out in Poultry Experimental Farm at Faculty of Agriculture, Ain-Shams University and Animal Production Department, National Research Centre (NRC), Dokki, Egypt. Kowmi -1 variety of mungbean seeds (*Vigna radiate*) was introduced to Egypt in last few years by National Research Centre (NRC) and is now cultivated in some reclaimed areas.

Chemical composition:

Chemical composition of MBS and that of soybean meal (SBM) was determined according to A.O.A.C (1990). Amino acids in MBS and SBM were determined according to the method described by Duranti and Ceriletti (1979) using the Spackman amino acid analyzer model 118/119 CL (Spackman, 1958). Methionine and cystine were detected by the procedure described by Moore (1961). The chemical score values (CS) were calculated according to the modified method of Mitchell and Block (1946) using amino acids requirement for growing chicks (0 - 3 weeks) according to NRC (1994). The essential amino acids index (EAAI) was calculated based on whole egg protein according to Oser (1951).

Total protein efficiency (TPE):

The modified method of Woodham *et al.* (1972) was employed to determine the total protein efficiency (TPE).Ninety, one-day-old commercial broiler chicks were used in this experiment. Birds were housed in wire battery brooders provided with a thermostatically controlled heating unit. A commercial starter diet was fed during two weeks. At 14 days of age , the birds were individually weighed to the nearest gram and randomly divided into three equal groups of approximately similar average initial body weight. Birds of each group were subdivided into three replicates of ten birds each. The experimental diets contain 18.4% crude protein , which was consisted of 12% crude protein provided either from SBM or MBS. The composition of the basal (SBM) and tested diets (MBS or MBS + methionine) is shown in Table (1). The experimental diets were given *ad-labium* to the experimental groups from 14 to 28 days of age. The birds in each group were individually weighed and total feed consumption were recorded at the 28th day. The values of body weight gain, feed conversion ratio and total protein consumed were calculated. Then the total protein efficiency was calculated as follows:

$$\textbf{TPE} = \frac{\text{Weight gain of all birds in each group}}{\text{Protein consumed by each group}}$$

Table 1.Composition of the basal and tested diets used for the determination of total protein efficiency (TPE).

Ingredients	Diets (%)		
	SBM	**MBS**	**MBS +Methionine**
Yellow corn	41.00	41.00	41.00
Soybean meal (44%)	27.27	-	-
Mungbean (25%)	-	48.00	48.00
Corn gluten meal (62%)	4.41	4.41	4.36
Di-calcium phosphate	1.32	1.20	1.20
Limestone	1.38	1.50	1.50
DL- methionine	-	-	0.05
Starch	19.77	1.38	1.38
Corn oil	-	1.81	1.81
Cellulose	4.15	-	-
NaCl	0.40	0.40	0.40
Vit. Min. mixture *	0.30	0.30	0.30
Total	100	100	100
Calculated analysis: Crude protein %	18.38	18.38	18.38
ME (Kcal/ Kg)	2935	2938	2938
Calcium %	0.92	0.92	0.92
Av.Phosphorus%	0.36	0.36	0.36
Methionine %	0.30	0.25	0.30
Methionine +Cystine %	0.60	0.42	0.46

*** Each 3 Kg. contains :Vit.A 12mIU; Vit.D_3 2.2mIU; Vit.E 10g; Vit.K 2g; Vit.B_1 1g; Vit.B_2 5g;Vit.B_6 1.5g; Vit.B_{12} 10mg; Niacin 30g; Pantothenic acid 10g; Folic acid 1g; Biotin 50mg; Choline 300g; Iron 30g; Iodine 1g;Zinc 50g; Manganese 60g; Copper 4g.Selenium 100 mg and Cobalt 100 mg.**

Growth Performance:

A total number of 240 one – day old Arbor-Acres broiler chicks were wing banded, individually weighed to the nearest gram and randomly divided into 4 treatment groups with 3 replicates each (20 birds x 3 replicates x 4 groups). Birds were kept in previously cleaned and fumigated batteries of wire floored cages in an open – system house. The experimental diets (Table 2) were formulated to substitute 0, 20, 30 and 40% of soybean meal protein by equivalent amounts of mungbean seeds protein. All experimental diets were iso – caloric and iso- nitrogenous. The birds fed the experimental diets and had free access to feed and water all over the experimental period which lasted for 49 days of age. Heating and lighting as well as vaccination were provided according to brooding and rearing standards protocols.

Table 2 : Composition and calculated analysis of the experimental diets

Ingredients	Treatments (%)							
	Starter / Grower				Finisher			
	1	2	3	4	1	2	3	4
Yellow corn	61.60	55.50	52.40	49.35	70.17	65.03	62.53	59.96
Soybean meal (44%)	30.00	24.00	21.00	18.00	25.00	20.00	17.50	15.00
Mungbean (25%) ***	-	10.56	15.84	21.11	-	8.80	13.20	17.60
Corn gluten meal (62%)	4.00	4.87	5.29	5.70	0.81	1.52	1.85	2.18
Di-calcium phosphate	1.75	1.75	1.75	1.75	1.80	1.80	1.80	1.80
Lime stone	1.10	1.10	1.11	1.11	0.81	0.83	0.80	0.82
NaCl	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
DL.methionine	0.10	0.11	0.13	0.15	0.06	0.06	0.08	0.09
Lysine HCl	0.06	-	-	-	-	-	-	-
Vit. & Min. mixture88* **	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Poultry fat	0.70	1.42	1.79	2.14	0.66	1.27	1.55	1.86
Total	100	100	100	100	100	100	100	100
Calculated analysis*** :								
Crude protein %	21.03	21.00	21.00	21.01	17.50	17.50	17.51	17.50
ME (Kcal \ Kg diet)	2945	2950	2952	2954	2995	2999	3001	3002
Calcium %	0.92	0.91	0.91	0.91	0.81	0.81	0.80	0.81
Available phosphorus %	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Methionine %	0.46	0.46	0.47	0.49	0.35	0.35	0.36	0.36
Methionine + Cystine %	0.80	0.77	0.77	0.77	0.65	0.61	0.62	0.61
Lysine %	1.06	1.05	1.07	1.09	0.86	0.90	0.91	0.93
Na %	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
EE %	3.38	4.00	4.32	4.63	3.55	4.07	4.31	4.58
CF %	3.51	3.28	3.17	.05	3.30	3.12	3.02	2.93

*** Mungbean seeds contains : DM 90.47% ; crude protein 25% ; ether extract 1.53%; crude fiber 3.01% ; ash 3.06 ; nitrogen free extract 57.87; calcium 0.14% , Phosphorus 0.59 % ; methionine 0.24% Cystine 0.10% and lysine 1.97%.**

**** Each 3 Kg. contains :Vit.A 12mIU; Vit.D_3 2.2mIU; Vit.E 10g; Vit.K 2g; Vit.B_1 1g; Vit.B_2 5g;Vit.B_6 1.5g; Vit.B_{12} 10mg; Niacin 30g; Pantothenic acid 10g; Folic acid 1g; Biotin 50mg; Choline 300g; Iron 30g; Iodine 1g;Zinc 50g; Manganese 60g; Copper 4g.Selenium 100 mg and Cobalt 100 mg.**

*****According to NRC (1994)**

Data on live body weight, feed consumption and mortality were recorded while those of body weight gain and feed conversion were calculated. Protein utilization (PU) and efficiency of energy utilization (EEU) were calculated as follows:

PU = Weight gain (g) / Protein consumed (g)

EEU = ME consumed (K.cal) / Weight gain (g)

Performance index (PI) was calculated according to North (1981) as Follows:

PI = (Live body weight, kg / Feed conversion) x 100

Statistical analysis:

Data were statistically analyzed using the general linear model (SX, 1992). A simple one way classification analysis of variance was used followed by LSD test for testing the significance between means.

RESULTS AND DISCUSSION

The chemical composition of MBS (Kawmy-1) and SBM are presented in Table (3). The results of proximate analysis for MBS, recorded values of 9.53% moisture, 25% crude protein (CP), 1.53% ether extract (EE), 3.01 % crude fibers (CF), 3.06% ash, 0.14% calcium (Ca), 0.59% phosphorus (P) and 57.87% nitrogen free extract (NFE). It is clear that its moisture content was less than 10%, indicating the possibility of storing MBS for a long time without deleterious effect. This value of moisture content was coincided with that reported (9%) by Khalil (1996) , while it was slightly lower than that (10.94%) obtained by El-Alfy (1998).

Table 3: Chemical composition of Mungbean seeds (MBS) as compared with Soybean meal 44% (SBM).

Nutrients	MBS %[(1)]	SBM 44 %%[(2)]
Moisture %	9.53	11
Crude protein %	25.00	44
Ether extract %	1.53	0.8
Crude fibers %	3.01	7
Ash %	3.06	6.5
Nitrogen free extract (NFE) %	57.87	30.7
ME (Kcal /Kg)	2500[(3)]	2230
Calcium %	0.14	0.29
Phosphorus (Total) %	0.59	0.65

(1) Determined. (2) According to NRC (1994).
(3) According to Titus and Fritz (1971).

Crude protein value of MBS was approximately equal to those recorded by El- Khimsawy *et al*. (1998) and Abou-Zeid *et al*. (2001). They found that CP content in MBS ranged from 24 to 26%. Ether extract (EE) , crude fiber (CF), ash and nitrogen free extract (NFE) values of MBS obtained in this study are in agreement with the results of Khalaf Alla (1995) , EL – Alfy (1998) and Abou – zeid et al .(2001).

The obtained results (Table 3) clearly showed that ash content in MBS (3.06%) was nearly similar to that reported by Annem and Rolland , 1975 (3.4%) , EL-Damhoughy *et al*. ,1996 (3.65%) and El-Alfy ,1998 (3.32%) . It can be observed that calcium content (0.14%) was lower than the range (0.27-0.65%) reported by Iqtidar and Saleem (1995) and El-Damhougy e*t al.* (1996). On the other hand, phosphorus content (0.59%) was higher than those mentioned by El- Damhougy *et al*. (1996) being 0.29-0.53%. comparing MBS with SBM, it can noticed that EE and NFE values were higher in MBS than those of SBM, while CP, CF, ash, calcium and phosphorus values were lower in MBS than those reported for SBM.

Generally, the proximate analysis of MBS indicated its reasonable nutritional value in formulating broiler diets due to either its CP and NFE or ME content. The results of the chemical analysis also showed its low content of CF, which is considered to be a limiting factor in formulating poultry diets.

The essential amino acids (EAAs) content, the calculated values for Chemical score (CS) and essential amino acid index (EAAI), as well as, the limiting amino acids in each tested material (MBS and SBM) are shown in Table (4). The data showed that MBS contained reasonable amounts of EAAs that compared favourably with SBM. Mungbean seeds, also, had contained higher level of lysine (7.88 g /16g N) than SBM (6.11g/16g N). The EAAs content of MBS are in agreement with those obtained by El- Alfy (1998) and Abou-Zeid *et al*. (2001). These results indicated that MBS protein appeared to have balanced EAAs pattern. It can be observed also from Table (4) that total EAAs were 55.64% and 58.35% in MBS and SBM proteins, respectively. These results revealed that MBS protein is superior to most legumes seeds such as peas (44.46%) beans (44.97%) and soybean seeds (42.89%) as mentioned by Schaible (1970).

It can be observed also from Table (4) that essential amino acid index (EAAI) of MBS was 64.29% , while that of SBM was 72.07% as calculated on whole egg protein base. These results indicated that MBS protein has a good protein quality. Comparing amino acids content of MBS with that required for chicks growth, based on NRC (1994) values during the first three weeks of age, indicated that arginine, phenylalanine, threonine and sulfur containing amino acids are lower than that required for optimum growth, while the other amino acids being higher than that recommended for chick growth. However, the calculated chemical score (SC) value indicated that methionine was the first limiting amino acid (FLAA) in MBS and SBM, respectively.

Table 4: The essential amino acids (g / 16 g nitrogen), chemical score (CS), first limiting amino acid (FLAA) and essential amino acids index (EAAI) of Mungbean seeds (MBS) as compared with soybean meal (SBM, 44%) .

ITEM %	MBS (1)	SBM (2)	Whole egg (3)	Chick requirements (0-3 weeks) (2)
Arginine	4.92	7.14	6.40	5.43
Histidine	3.04	2.66	2.10	1.52
Lysine	7.88	6.11	7.20	4.78
Phenylalanine	1.43	4.91	-	3.13
Phenylalanine+ Tyrosine	8.16	9.25	10.80	5.83
Methionine	0.96	1.41	4.10	2.17
Methionine + Cystine	1.36	2.91	6.50	3.91
Threonine	3.00	3.91	4.90	3.48
Isoleucine	4.92	4.45	8.00	3.48
Leucine	8.84	7.70	9.20	5.22
Valine	5.40	4.70	7.30	3.91
Glycine + Serine	8.12	9.52	-	5.43
Total EAAs	55.64	58.35	62.40	45.99
EAAI	64.29	72.07	100	-
CS	34.78	64.98	-	100
FLAA	Methionine	Methionine	-	-

(1) Determined. (2) According to NRC (1994).
(3) According to Mitchell and Block (1946).

These results are in agreement with the finding of Hang *et al*. (1980), El – Khimsawy *et al*. (1998) and Abou- Zeid *et al*. (2001) who showed that the sulfur containing amino acids are the first limiting amino acid in MBS protein.

Also, Hang *et al*. (1980) reported that methionine + cystine was the first limiting amino acids in pea bean and red Kidney bean.

Total protein efficiency (TPE):

Data of the TPE values are shown in Tale (5). There were significant differences ($P<0.05$) between the two tested protein sources (MBS and SBM) in feed conversion ratio and TPE values, as SBM being superior. However, TPE value for MBS was improved significantly ($P<0.05$) by adding complementary level of methionine to achieve SBM with no significant difference (2.28 *vs*. 2.29 for MBS+ methionine and SBM treatments, respectively). These results revealed that TPE was significantly ($P<0.05$) reduced while feed conversion ratio was increased when birds fed MBS without any supplementation indicating that MBS protein could not completely replace SBM protein unless the limiting amino acids are covered and on the other hand, supplementation of MBS with methionine significantly($P<0.05$) improve TPE value. EL-Khimsawy *et al.* (1998) reported that supplementation of mungbean by methionine significantly ($P<0.05$) improved its biological value. Therefore, in order to improve the amino acids pattern of MBS, it can be used either in combination with other protein sources or after dietary supplementation with methionine.

Table (5): The Total Protein Efficiency (TPE) of Mungbean seeds (MBS) as compared with Soybean meal (SBM).

ITEM	Treatments		
	SBM	**MBS**	**MBS + Methionine**
Initial weight (g / bird)	185.4 ^{a}	184.7 ^{a}	182.06 ^{a}
Final weight (g / bird)	470.13 ^{a}	452.96 ^{a}	465.16 ^{a}
Weight gain (g / bird)	284.73 ^{a}	268.26 ^{a}	283.10 ^{a}
Feed consumption (g / bird)	691.13 ^{a}	712.43 ^{a}	690.63 ^{a}
Feed conversion ratio	2.43 ^{b}	2.66 ^{a}	2.44 ^{b}
Protein consumption (g / bird)	124.40 ^{a}	128.23 ^{a}	124.31 ^{a}
TPE	**2.29 ^{a}**	**2.09 ^{b}**	**2.28 ^{a}**

a, b, c… means with different superscript(s)in the same row are significantly different ($P < 0.05$).

Growth Performance

The effects of feeding mungbean seeds at various levels (0, 20, 30 or 40 %) of soybean meal protein on the performance of young chicks are shown in Table (6). The results revealed that, during the periods of starter/grower (0-4 weeks) and finisher (5 – 7 weeks) as well as the whole experimental period (0-7 weeks), the addition of mungbean seeds at any studied level resulted in no significant differences in live body weight gain ($P < 0.05$) compared to the control without supplementation . The values of weight gain for the treatment group T2 (20% replacement), T3 (30% replacement) and T4 (40% replacement) in comparison to the control group T1 (0% mungbean) recorded 107.8, 105.1 and 102.9% at 0-4 weeks; 100.3, 102.5 and 106% at 5-7 weeks and 103.1, 103.5 and 104.9% at 0-7 weeks, respectively. These results showed that the chicks fed T4 diet (40% replacement of soybean meal protein by mungbean seeds) had the highest values of weight gain among all treatments either at 5-7 weeks or at 0-7 week's periods. These results suggested that mungbean seeds could be used in broiler diets up to 40% of soybean meal protein without any deleterious effect on body weight gain.

No significant differences (P < 0.05) were detected in feed intake among different dietary treatments either during starter/ grower period, finisher period or the whole experimental period (Table 6). The average feed consumption values at starter / grower period (0-4 weeks) were 1066, 1130, 1079 and 1043 grams for T_1, T2, T3 and T_4, respectively. While it were 2227, 2204, 2291 and 2263 grams and 3293, 3334, 3270 and 3301 grams for finisher period (5-7weeks) and allover the experimental period (0-7 weeks), respectively. These results indicated that increasing the dietary mungbean seeds level had no negative effect on the amount of feed consumed.

Table 6: The effect of using different dietary levels of mungbean seeds on the performance of broiler chicks.

ITEM	Mungbean levels (% of Soybean meal protein)				
	Zero	20 %	30 %	40 %	SE* ±
0 - 4 weeks of age :					
Live body weight (g / bird)	604.4 ^{a}	649.40 ^{a}	634.26 ^{a}	627.55 ^{a}	45.98
Body weight gain (g / bird)	570.13 ^{a}	614.73 ^{a}	599.20 ^{a}	586.90 ^{a}	46.25
Feed consumption (g / bird)	1066.30 ^{a}	1130.30 ^{a}	1079 ^{a}	1043.30 ^{a}	96.9
Feed conversion	1.87 ^{a}	1.84 ^{a}	1.80 ^{a}	1.78 ^{a}	0.05
5 - 7 weeks of age :					
Live body weight (g / bird)	1591.40 ^{a}	1640.10 ^{a}	1646.10 ^{a}	1668 ^{a}	63.14
Body weight gain (g / bird)	987.03 ^{a}	990.30 ^{a}	1011.80 ^{a}	1046.30 ^{a}	59.84
Feed consumption (g / bird)	2226.60 ^{a}	2204 ^{a}	2191.30 ^{a}	2263 ^{a}	148.9
Feed conversion	2.25 ^{a}	2.23 ^{a}	2.17 ^{a}	2.16 ^{a}	0.09
0 - 7 weeks of age :					
Live body weight (g / bird)	1591.40 ^{a}	1640.10 ^{a}	1646.10 ^{a}	1668 ^{a}	63.14
Body weight gain (g / bird)	1557.10 ^{a}	1605 ^{a}	1611 ^{a}	1633.20 ^{a}	63.45
Feed consumption (g / bird)	3293 ^{a}	3334 ^{a}	3270.30 ^{a}	3301 ^{a}	176.5
Feed conversion	2.11 ^{a}	2.08 ^{a}	2.03 ^{a}	2.02 ^{a}	0.05

*** Standard error for comparison.**

a, b, c...........means with different superscript(s)in the same row are significantly different (P < 0.05).

A trend towards improvement in feed conversion was observed with increasing the dietary mungbean seeds level (Table-6). Overall means of feed conversion were 2.08, 2.03 and 2.02 for T_2, T3 and T_4, respectively as compared to 2.11 for control treatment (T_1). Although, there were no significant differences in feed conversion values among dietary treatments, the best feed conversion value had been obtained by the highest incorporation of dietary mungbean seeds level (40% replacement of soybean meal protein by mungbean seeds).

Generally, these results showed that feeding graded levels of untreated mungbean seeds up to 40% replacement of soybean meal protein (21.11% and 17.6% of the diet for the starter/ grower and finisher diets, respectively) resulted in no significant differences among treatments in weight gain, feed consumption and feed conversion values comparing to that given by the control group. These results are in agreement with those reported by Creswell (1981) and El- Alfy (1998) who found that the weight gain and feed conversion values of chicks fed mungbean diets up to 20% of the diet were similar (P <0.05) to those of chicks fed control diet. In this connection, El-Waly (1993) found that lupin seeds can be used to replace soybean meal in diets for meat chicks with no adverse effect on performance. Similarly, Quarantelli and Bonomi (1991) reported that the partial replacement of soybean meal up to 15% by pea meal in diets of broiler chicks resulted in similar performance among groups.

Although the groups fed diets supplemented with mungbean seeds had mostly better values of protein utilization (PU) than the control group for all periods studied however, the differences among treatments were not significant (Table 7).During the experimental periods (0-4, 5-7and 0-7weeks) of age , the PU was improved gradually in T2, T3 and T4 groups than the control one by 1.97 , 3.94 and 5.51 % ; 1.18 ,3.54 and 4.33 % and 1.41 , 2.36 and 4.72 % , respectively. These results show that the chicks of mungbean groups utilized protein more efficient than the control group.

Table 7: The effect of using different dietary levels of Mungbean seeds on protein utilization (PU), efficiency of energy utilization (EEU) and performance index (PI).

ITEM	Mungbean levels (% of soybean protein)				
	Zero	20%	30%	40%	SE*±
0- 4 weeks of age :					
PU	2-54	2.59	2.64	2.68	0.07
Relative	100	101.97	103.94	105.51	
EEU	5.53	5.44	5.31	5.25	0.15
Relative	100	98.37	96.02	94.94	
PI	32.30	35.40	35.23	34.93	3.23
Relative	100	109.60	109.07	108.14	
5 - 7 weeks of age:					
PU	2.54	2.57	2.63	2.65	0.1
Relative	100	101.18	103 54	104.33	
EEU	6.76	6.70	6.51	6.49	0.25
Relative	100	99.11	96.30	96.10	
PI	70.70	73.57	76.03	77.13	3.97
Relative	100	104.06	107.54	109.09	
0-7 weeks of age :					
PER	2.54	2.58	2.60	2.66	0.06
Relative	100	101.41	102.36	104.72	
EEU	6.31	6.20	5.98	6.04	0.18
Relative	100	98.24	94.77	95.76	
PI	75.37	78.87	81.17	82.97	3.45
Relative	100	104.64	107.70	110.08	

*** Standard error for comparison.**

With respect to efficiency of energy utilization (EEU), results show that the birds fed control diets required insignificantly more metabolizable energy to gain one unit of live body weight as compared to mungbean fed groups (Table7). Also, performance index (PI) did not show any statistical differences among treatments. In this connection, Khalifah (1995) found that when nigella seed oil meal (NSOM) replaced soybean meal protein up to 50%, feed consumption was insignificantly affected in comparison to the control, also protein consumption showed similar trend. He found some indications that feed conversion ratio and protein utilization improved with feeding 20% NSOM protein instead of SBM protein.

Generally, it can be concluded, from the current study, that MBS is an excellent poultry feedstuff as alternative source of protein, but it is not recommended to be used as the main source of protein in poultry diets because of its low content of sulfur amino acids. Therefore, in order to improve the amino acids pattern of MBS, it can be used either in combination with other protein sources or after dietary supplementation with methionine.

The present study indicated that mungbean seed provided enough and adequate nutrients for normal growth of broiler chicks. Moreover, according to that mungbean seeds had no adverse effect on growth performance, it could be concluded that mungbean seeds can be used safely in broiler diets as promising source of plant protein.

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التقييم الغذائي لبذور فول المانج في علائق دجاج التسمين

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أجريت هذه الدراسة بهدف التقييم الغذائي لصنف جديد (قومى-١) من بذور فول المانج كمصدر بروتين بديل فى علائق الدواجن. شمل التقييم كل من التحليل الكيميائى لتقديرالمكونات الكيميائية الأساسية وكذلك تقدير المحتوى من الأحماض الأمينية الأساسية الذى تم منه حساب قيم الدليل الكيميائى(CS) ودليل الأحماض الأمينية الأساسية (EAAI)ثم إجراء تجربة بيولوجية لدراسة كفاءة البروتين الكلية (TPE) لبذور فول المانج ، كما شمل التقييم دراسة تأثير إستخدام بذور فول المانج على الأداء الإنتاجى لكتاكيت اللحم .

أوضحت نتائج التقييم الكيماوى إحتواء بذور فول المانج فى المتوسط على: ٩,٥٣ % رطوبة، ٢٥% بروتين خام، ١,٥٣% دهن خام، ٣,٠١% ألياف خام، ٣,٠٦% رماد خام، ٥٧,٨٧% كربوهيدرات ذائبة. كذلك وجد أن بروتين فول المانج متوازن فى محتواه من الأحماض الأمينية ويحتوى على نسبة عالية من الحمض الأمينى ليسين مقارنة بكسب فول الصويا. كما وجد أن الأحماض الأمينية الكبريتية وخاصة المثيونين هى الأحماض الأمينية المحددة فى كل من بذور فول المانج ، كسب فول الصويا .

أوضحت نتائج التقييم البيولوجى أن معامل التحويل الغذائى وكفاءة البروتين الكلية (TPE) لمجموعة الطيور المغذاة على بذور فول المانج كانت أقل (معنويا) من تلك المغذاة على كسب فول الصويا ، بينما لم تظهر أية فروق معنوية فى هذه القياسات عند إضافة الحمض الأمينى ميثيونين إلى العلائق المحتوية على بذور فول المانج .

مما سبق يمكن إستنتاج أن بذور فول المانج تعتبر مصدرا جيدا للبروتين يمكن استخدامه فى علائق الدواجن خاصة بعد إضافة الحمض الأمينى ميثيونين للعليقة .

أجريت تجربة تطبيقية لدراسة تأثير التغذية بمستويات مخلتفة من بذور فول المانج على المظاهر الانتاجية لدجاج اللحم أستخدم فيها عدد٢٤٠ كتكوت "أربورإيكرز" قسمت عشوائيا الى أربع مجاميع تمثل كل مجموعة معامله غذائية وبكل مجموعة ٦٠ طائر(فى ثلاث مكررات بكل منها ٢٠طائر). تم تكوين العلائق التجريبية المختلفة بحيث تكون متساوية فى محتواها من الطاقة الممثلة والبروتين الخام وباقى المركبات الغذائية ولكن كان الأختلاف فى محتواها من بذور فول المانج حيث تم أحلاله بمستويات صفر ، ٢٠ ، ٣٠ ، ٤٠ % من بروتين كسب فول الصويا .

أوضحت النتائج عند عمر ٢٨ يوما أن معدل الزيادة فى وزن الجسم وقيم معامل التحويل الغذائى كانت تقريباً متشابهه فى المجموعات المغذاه على العلائق المحتوية على نسب مختلفة من فول المانج مع مجموعة المقارنة. أيضا عند عمر ٤٩ يوما لم يكن هناك تأثير معنوى لوجود بذور فول المانج بأى مستوى فى العلائق فيما يتعلق بكل من معدل الزيادة فى الوزن ،معامل التحويل الغذائى ،كفاءة استخدام كل من البروتين والطاقة ودليل كفاءة النمو (PI) . وبالتالى يمكن إستنتاج أنه يمكن إستخدام بذور فول المانج الخام فى علائق دجاج اللحم حتى نسبة ٤٠% من بروتين كسب فول الصويا فى كل من مرحلتى البادى / النامى والناهى والحصول على نفس الأداء الانتاجى للطيور المغذاه على علائق المقارنة.