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THE USE OF GRADED LEVELS OF SUNFLOWER MEAL IN GROWING PULLET DIETS

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ABSTRACT

This study was carried out to investigate the effects of feeding graded levels of sunflower meal (SFM) on the performance of Mamourah pullets during the growing period. Three hundred 11-week-old female chickens were randomly distributed into five experimental groups; each with three equal replications. The birds were housed, under a 14-hr daily lighting program, in floor pens, equipped with feeders and waterers and located at an open-sided house. Each floor pen contained 20 pullets and served as a replicate group. Five iso-nitrogenous (14% crude protein) and iso-energetic (metabolizable energy of about 2800 kcal/kg) experimental diets containing graded levels of sunflower meal (0.00, 5.75, 11.50, 17.25 and 23.00% of the diet) were formulated and used. The birds were fed the respective experimental diets up to 21 weeks of age. Feed and water were provided *ad libitum*. The performance was assessed by body weight, body weight gain, mortality rate, feed intake and feed conversion, as well as feed cost per pullet. Digestibilities of nutrients of the experimental diets were determined using adult cockerels. Carcass yield and other slaughter traits were also determined. In addition, some blood constituents (serum glucose, total protein, total lipids and cholesterol as well as activities of serum transaminases; AST and ALT) were measured. The statistical analyses of the data detected no significant differences among treatments in all studied criteria, with the exception of abdominal fat contents. Dietary inclusion of SFM at levels of 17.25 and 23.00% resulted in a significant increase ($P \leq 0.05$) in abdominal fat contents of 21-week-old Mamourah pullets compared with their control counterparts. As long as the performance, feeding cost and mortality rate were put into consideration, it can be concluded that growing pullets could utilize dietary sunflower meal up to 23% of the diet (100% in place of soybean meal) as economically as soybean meal without any detrimental effects on their health status or growth performance.

Keywords: Sunflower meal, pullets, growth performance, nutrient digestibility, carcass yield, blood parameters

INTRODUCTION

Sunflower (*Helianthus annuus L*.) is an oil-seed crop, which is cultivated worldwide for oil production, due to its great capability of adaptation to different climatic and soil conditions (Ravindran and Blair, 1992). The by-product rendered by the oil industry, sunflower meal (SFM), is used as an alternative source of protein in animal nutrition. Its crude protein content depends on dehulling and oil-extraction process. The high fiber content of SFM and its deficiency of lysine are responsible for its limited use in poultry diets. The scientific literature contains a variety of inconsistent perspectives concerning the nutritive value of SFM. Zatari and Sell, (1989) and Vieira *et al*. (1992) reported successful results in broiler chickens and laying hens using

high levels of SFM (20%) in diets formulated with adequate levels of lysine and energy. Rose *et al.* (1972) reported that SFM replaced 50% of soybean meal protein in the diet, without adversely affecting laying hen performance, however, 100% replacement ratio resulted in less performance for egg production and feed efficiency. Hegedüs and Fekete (1994) found that extracted soybean meal could partly or entirely be replaced with extracted SFM in broiler and laying hen isocaloric diets when supplemented with lysine and methionine. Gippert (1994) indicated that extracted sunflower meal, after mechanical processing and supplementation with lysine, could be used at levels of 10 – 15% in broiler diets with good results.

However, Rad and Keshavarz (1976), Raya *et al*. (1989b) and Gippert (1994) demonstrated that lysine is the first limiting amino acid in poultry rations containing high levels of SFM. Cuca *et al*. (1973) reported that threonine appears to be the second limiting amino acid for broiler chicks and laying hens fed high levels of SFM. Michel and Sunde (1985) found that SFM, supplemented with lysine and methionine instead of soybean meal in pullet developer diets, improved both feed efficiency and economic efficiency. El-Deek *et al*. (1999) used SFM in grower and pullet diets instead of soybean meal up to 100%. They concluded that SFM could be fed without adverse effects on the growth performance measurements. Sherif *et al*. (2001) demonstrated that, taking into consideration the practical and economic aspects, SFM could be used in laying hen diets up to 27% of the diet without any adverse effects on their productive and reproductive performance.

Nutrition of the replacement pullets during the pre-laying period is of considerable importance, because of its carrying-over effects on subsequent productive and/or reproductive performance. Growth of pullets is an important factor, but other factors such as feed intake, feed conversion, mortality rate and feed cost per pullet are considered to be more important.

Very limited information is available on the nutritive value of locally produced SFM for the native strains of chickens in Egypt. It is interesting to note that Mamourah is one of the most important Egyptian strains of chickens. It was evolved by crossing between two strains of native chickens (Dokki-4 and Alexandria, as maternal and paternal lines respectively) at the Poultry Research Station, Montazah Palace, Alexandria, Egypt.

The research reported herein was conducted to determine the influence of including sunflower meal up to 23% in Mamourah growing pullet diets on performance, digestibility of nutrients, carcass yield and some blood parameters.

MATERIALS AND METHODS

This experiment was carried out at El-Serw Poultry Research Station, Animal Production Research Institute, Ministry of Agriculture. Three hundred 11-week-old female chickens were randomly distributed into five experimental groups. Twenty growing pullets were housed in each of 15 floor pens, equipped with feeders and waterers and supplied with a daily photo-period of 14 h. Each of the five groups was assigned to three pens. Floor space

allowance was 0.3 m^2 per pullet. All floor pens were inside an open-sided house. The birds had free access to feed and water throughout the experimental period elapsed from 11 to 21 weeks of age.

Five experimental mash diets containing graded levels of SFM (0.00, 5.75, 11.50, 17.25 and 23.00% of the diet) were formulated and used (Table 1). The chemical composition and the energy content of SFM used in this study were as follows: 33% crude protein, 24.67% crude fiber, 1.4% ether extract, 0.3% calcium, 0.4% available phosphorus, 1.2% lysine, 0.65% methionine, 0.55% cystine and metabolizable energy (ME) of 1800 kcal/kg. The control group was fed on a corn-soybean meal-based diet and the other experimental groups were fed on their respective experimental diets. All diets were formulated to be iso-energetic (ME of about 2800 kcal/kg) and iso-nitrogenous (14% crude protein).

During the experimental period, the criteria of performance, measured on a pen basis, were biweekly body weight of birds, body weight gain, feed intake and feed conversion (grams of feed consumed per one gram of gain). Mortality was monitored and recorded daily. Market prices of feed ingredients, predominant during the duration of study, were used to compute the cost per kilogram of each experimental diet (Table 1). The latter alongside the cumulative feed intake during the entire experimental period were used to calculate feed cost per pullet (Table 2).

To evaluate the digestibility of nutrients of the experimental diets, a metabolism trial was conducted using 15 adult Mamourah cockerels; with average body weight of about 2.75 kilograms. Each experimental diet was fed to three cockerels for three days as a preliminary period, followed by a three-day collection period, where excreta were quantitatively collected. Simultaneously, records of daily feed consumption for each bird were maintained. The daily excreta voided by cockerels in each treatment were pooled and thoroughly mixed. Then, representative excreta samples were taken and dried immediately. The procedure described by Jakobsen *et al*. (1960) was used for separating fecal protein in excreta samples. Urinary organic matter (UOM) was determined according to the equation developed by Abou-Raya and Galal (1971) as follows: UOM %= urinary nitrogen % $\times$ 2.62. Digestion coefficients of organic matter, crude protein, crude fiber, ether extract and nitrogen free extract were calculated according to the following equation: Digestion coefficient % = (nutrient intake, g – fecal nutrient, g / nutrient intake, g) $\times$ 100.

AT the end of the experiment (21 weeks of age), four pullets from each treatment, with approximately the same average body weight, were selected and slaughtered. For evaluating carcass yield and components, the relative weights of dressed carcass, giblets, front parts, hind parts, total edible parts and abdominal fat contents were determined. Dressed carcass was separated at the end of ribs into two parts called front (breast + wings + neck) and hind (thighs + drumsticks + back) parts. In order to reduce variation in the cutting procedure, all dissections were carried out by one experienced operator. Four blood samples were taken from the wing veins of 21-week-old pullets of each group. The concentrations of serum glucose, total protein, total lipids and cholesterol were determined using commercial kits according

to the methods of Trinder (1969), Henry (1964), Frings and Dunn (1970), and Allain *et al*. (1974), respectively. Activities of serum aspartate-aminotransferase (AST; EC. 2.6.1.1.) and alanine-aminotransferase (ALT; EC. 2.6.1.2.) were also determined colorimetrically by kits according to the methods of Reitman and Frankel (1957).

Proximate analyses of the experimental diets (Table 1), sunflower meal and excreta were determined according to the official methods (A.O.A.C., 1984). Data were processed using Quattro Program software (Borland International, Inc., 1990). Statistical analyses of the results were performed using Statgraphics Program software, Version 5.0 STSC (Rockville, 1991).

Table 1: Composition and chemical analyses of the experimental diets

Ingredients %	Experimental diets				
	1 (Control)	2	3	4	5
Yellow corn	69.00	69.30	69.20	69.15	69.44
Soybean meal (44% CP)	13.97	10.49	6.90	3.38	0.00
Wheat bran	12.90	10.30	8.20	6.00	3.30
Sunflower meal (33% CP)	0.00	5.75	11.50	17.25	23.00
Dicalcium phosphate	2.0	2.0	2.0	2.0	2.0
Limestone	1.5	1.5	1.5	1.5	1.5
Common salt	0.3	0.3	0.3	0.3	0.3
Vit. & Min. Premix*	0.3	0.3	0.3	0.3	0.3
DL-Methionine	0.03	0.03	0.02	0.00	0.00
L-Lysine	0.00	0.03	0.08	0.12	0.16
Total	100	100	100	100	100
Calculated analyses:					
Crude protein, %	14.04	14.02	14.00	14.00	14.01
ME, kcal/kg	2791	2793	2786	2780	2783
Crude fiber, %	3.91	4.81	5.74	6.67	7.56
Ether extract, %	3.12	3.11	3.09	3.08	3.06
Ca, %	1.08	1.08	1.09	1.09	1.10
Total P, %	0.81	0.81	0.82	0.81	0.82
Non-phytate P, %	0.49	0.50	0.51	0.52	0.53
Lysine ,%	0.63	0.62	0.63	0.63	0.64
Methionine, %	0.27	0.28	0.28	0.27	0.28
Meth. + Cyst., %	0.53	0.54	0.54	0.53	0.54
Feed cost, P. T. / kg diet	54.6	54.1	53.6	52.9	52.6
Determined analyses (DM basis):					
Dry matter, %	89.43	89.61	89.50	89.81	90.01
Ash, %	6.64	6.60	6.67	6.74	6.72
Organic matter, %	93.36	93.40	93.33	93.26	93.28
Crude protein, %	15.78	15.81	15.74	15.62	15.72
Crude fiber, %	4.17	5.04	6.19	7.35	8.18
Ether extract, %	3.53	3.57	3.49	3.63	3.60

***: Each three kilograms contains: Vit. A 10,000,000 I. U; Vit. D_3 2,000,000 I. U; Vit. E 10,000 mg; Vit, K_3 1,000 mg; Vit. B_1 1,000 mg; Vit. B_2 5,000 mg; Vit. B_6 1,500 mg; Vit. B_{12} 10 mg; Biotin 50 mg; Choline chloride 250,000 mg; Pantothenic acid 10,000 mg; Nicotinic acid 30,000 mg; Folic acid 1,000 mg; Mn 60,000 mg; Zn 50,000 mg; Fe 30,000 mg; Cu 4,000 mg; I 300 mg; Se 100 mg; Co 100 mg.**

One-way analysis of variance was used to estimate the significant differences among dietary treatments. Differences were considered significant at $P \leq 0.05$.

RESULTS AND DISCUSSION

Pullet growth performance:

Effects of feeding graded levels of SFM-containing diets on body weight, total mortality rate and feed cost per bird of Mamourah growing pullets are presented in Table 2. Performance of pullets, as assessed by daily feed intake, daily body weight gain and feed conversion, is summarized in Table 3. There were no significant differences in body weight of pullets, at different ages, due to dietary treatments. Data presented in Table 2 clearly indicate that mortality was not related to dietary treatments. When feed cost was evaluated per pullet, all SFM-diets were slightly cheaper than that of the control. The dietary inclusion level of SFM in growing pullet diets had no significant effects on the performance of pullets in terms of feed intake, weight gain or feed conversion, during the entire experimental period (11-21 weeks of age).

Table 2: Means ± standard errors* of body weight (g), total mortality rate (%) and feed cost for Mamourah pullets fed diets containing graded levels of sunflower meal from 11 to 21 weeks of age

Age in weeks	Experimental diets				
	1 (control)	2	3	4	5
11	532.7±15	537.0±14	530.3±12	546.3±16	541.2±13
13	750.3±20	737.3±16	723.6±16	730.3±20	744.5±17
15	948.8±25	975.2±20	930.1±20	913.6±25	943.6±22
17	1122.5±29	1144.3±25	1086.0±27	1071.2±27	1123.9±27
19	1255.9±33	1293.3±25	1227.1±36	1198.8±34	1287.1±33
21	1372.7±37	1422.6±25	1376.1±38	1334.1±38	1441.8±38
Total mortality rate, % (11-21 weeks of age)					
	8.33	5.00	6.67	10.00	8.33
Feed cost per pullet, P. T. (11-21 weeks of age)					
	337	326	321	303	323

***: No significant differences were observed among treatments in all criteria studied.**

These results are in agreement with the report of El-Deek *et al.* (1999) who found that replacing soybean meal with SFM in grower and pullet diets, partially or completely, had no significant effects on criteria of growth performance. Similarly, Michel and Sunde (1985) observed no significant differences in 20-week-old body weights of pullets, feed consumption or feed utilization, when they were fed two types of SFM (a 28% CP-SFM and a 34%CP-SFM at dietary inclusion levels of 18 and 14%, respectively) compared with their control counterparts. Those authors also found that, when the pullet developer diets were supplemented with lysine and methionine, both feed and economic efficiency improved. Available data on

broiler chickens, however, indicate that about 50% of soybean meal protein could be replaced by SFM protein without any adverse effect on growth or feed conversion (Afifi, 1972; Rad and Keshavarz, 1976).

Table 3: Means ± standard errors* of daily feed intake, weight gain and feed conversion for Mamourah pullets fed diets containing graded levels of sunflower meal from 11 to 21 weeks of age

Periods (wks)	Experimental diets				
	1 (control)	2	3	4	5
Daily feed intake (g)					
11-13	68.5±1.6	69.0±1.8	64.0±1.9	57.6±3.5	64.4±3.9
13-15	90.5±1.6	85.1±2.0	91.1±2.7	91.1±1.3	91.5±2.0
15-17	90.9±1.8	86.7±2.7	86.3±1.6	82.1±0.3	89.3±2.6
17-19	99.4±3.7	95.5±1.7	97.1±3.2	88.3±2.3	101.9±3.1
19-21	91.2±4.4	94.4±2.5	89.1±2.2	89.7±7.6	91.7±3.5
11-21	88.1±2.1	86.1±1.1	85.5±1.4	81.8±1.9	87.8±0.2
Daily body weight gain (g)					
11-13	15.5±0.3	14.3±0.2	13.8±0.7	13.1±1.0	14.5±0.3
13-15	14.2±1.0	17.0±0.2	14.7±0.3	13.1±2.2	14.2±1.1
15-17	12.7±0.6	12.1±0.8	11.3±1.4	11.3±1.2	12.9±1.7
17-19	9.3±1.3	10.6±1.0	10.0±0.4	9.2±0.6	11.7±0.9
19-21	8.4±1.8	9.2±1.3	10.6±0.5	9.7±1.6	11.1±0.8
11-21	12.0±0.3	12.7±0.2	12.1±0.4	11.3±0.4	12.9±0.6
Feed conversion (g:g)					
11-13	4.42±0.2	4.83±0.1	4.64±0.1	4.39±0.1	4.43±0.3
13-15	6.37±0.6	5.01±0.1	6.19±0.3	6.95±1.05	6.44±0.4
15-17	7.16±0.2	7.17±0.6	7.64±1.0	7.27±0.7	6.92±1.3
17-19	10.69±1.0	9.01±0.8	9.71±0.7	9.60±0.8	8.71±0.5
19-21	10.86±2.1	10.26±1.4	8.41±0.4	9.25±0.7	8.26±0.9
11-21	7.34±0.2	6.78±0.1	7.06±0.1	7.24±0.1	6.81±0.3

***: No significant differences were observed among treatments in all criteria studied.**

Nutrient digestibility:

Data on percentages of ash and nitrogen retention and digestion coefficients (digestibilities) of dry matter (DM), organic matter (OM), crude protein (CP), ether extract (EE), crude fiber (CF) and nitrogen-free extract (NFE) are illustrated in Table 4. There were no significant differences either in ash and nitrogen retention or in the digestibilities of DM, OM, CP, EE, CF and NFE due to feeding diets containing graded levels of SFM up to 23% of the diet.

These findings are in agreement with those reported by Russom *et al.* (1972) in their work conducted with pigs; as they found no significant differences in digestibility of DM, CP, CF, EE or energy when compared SFM with soybean meal as protein sources for pigs. Similarly, Green *et al.* (1987) evaluated the digestibilities of amino acids in three protein sources; namely, soybean meal, SFM and groundnut meal, for adult cockerels. They concluded

that neither the true digestibility of nitrogen nor that of the sum of the amino acids differed between protein sources. On the other hand, Raya *et al*. (1989b) reported significant differences in digestion coefficients of DM, CP, EE and OM in favor of adult cockerels fed on SFM-containing diets compared with those fed on the control diet. While the digestion coefficients of CF and NFE as well as ash and nitrogen retention were not significant. The previous authors have used a 44% CP-SFM, while in the present study a 33% CP-SFM was used. The conflicting results with respect to the digestibility of nutrients of sunflower meal-containing diets may be attributed to the crude protein and/or crude fiber contents of SFM. Villamide and San Juan (1998) found that the true amino acid digestibility (TAAD) of SFM increased proportionally with its CP content and stated that values of total TAAD were 86, 88 and 89% for SFM of 32, 35 and 37% CP, respectively.

Table 4: Means ± standard errors* of ash and nitrogen retention and digestion coefficients of nutrients of the experimental diets determined with adult Mamourah cockerels

Item, %	Experimental diets				
	1 (control)	**2**	**3**	**4**	**5**
Ash retained	34.52±2.5	35.77±3.3	34.54±3.4	37.22±.0.7	35.71±3.8
N-retained	41.17±0.5	40.38±2.4	42.12±3.3	43.09±2.6	44.44±7.0
Digestion coefficient, %:					
DM	73.71±0.1	74.11±0.8	74.20±2.0	74.17±1.4	74.68±3.0
OM	76.31±0.1	76.82±0.6	76.90±2.1	76.64±1.5	77.35±3.0
CP	76.45±0.2	76.65±0.8	76.95±1.8	76.61±1.3	76.82±3.0
EE	79.70±1.3	75.50±3.0	77.24±2.7	79.26±1.1	82.06±0.9
CF	19.01±0.5	18.94±0.6	18.83±1.3	19.69±1.3	19.45±2.1
NFE	87.74±0.1	89.47±0.2	90.42±1.9	90.91±1.4	92.35±2.5

***: No significant differences were observed among treatments in all criteria studied.**

Carcass yield and other slaughter traits:

Data on selected criteria of carcass yield and other slaughter traits of 21-wk-old Mamourah pullets, as affected by feeding graded levels of SFM from 11 up to 21 weeks of age, are shown in Table 5. Dietary inclusion of SFM had no significant effects on all studied carcass criteria, with the exception of abdominal fat contents. The relative weights of abdominal fat of pullets (Table 5) were about the same for all dietary treatments, except for groups of birds fed the highest two levels of SFM; which exhibited a significant increase ($P \leq 0.05$) in abdominal fat of their carcasses compared with the other experimental groups.

There was no clear explanation for such a response, for three reasons. Firstly, all the experimental diets were iso-energetic and iso-nitrogenous (Table 1). Secondly, there were no significant differences among the various experimental groups in either feed intake or feed conversion (Table 3). Thirdly, mean slaughter weight of pullets was simultaneously the same in all

the experimental groups (Table 5). However, the observed increase in abdominal fat contents may be a consequence of the low number of birds processed per treatment; which perhaps had high individual variations in carcass composition, unrelated to the effect of dietary treatment.

Table 5: Means ± standard errors of carcass yield and some slaughter traits for 21-wk-old Mamourah pullets fed diets containing graded levels of sunflower meal

Criteria (%)	Experimental diets				
	1 (control)	2	3	4	5
LBW, g[1]	1390±12	1405±31	1385±3	1392.5±16	1407.5±17
Blood	3.79±0.1	4.17±0.4	3.70±0.4	4.14±0.3	4.29±0.5
Feather	7.92±0.6	8.85±0.3	8.67±0.3	7.91±0.6	7.63±0.3
Head	2.84±0.08	2.79±0.11	2.73±0.04	2.55±0.10	2.50±0.08
Legs	2.99±0.13	3.11±0.07	3.29±0.14	2.96±0.04	3.02±0.13
Abdominal fat	0.88±0.10[b]	0.87±0.05[b]	0.92±0.08[b]	1.36±0.17[a]	1.35±0.22[a]
Liver	2.13±0.14	1.85±0.12	2.15±0.03	2.14±0.13	1.97±0.10
Gizzard	1.78±0.18	1.95±0.18	2.00±0.09	2.01±0.11	1.96±0.09
Heart	0.39±0.02	0.41±0.02	0.42±0.02	0.39±0.01	0.49±0.05
Giblets[2]	4.30±0.30	4.20±0.27	4.57±0.11	4.55±0.12	4.42±0.17
Dressed carcass[3]	61.94±0.6	62.87±0.8	61.77±0.4	61.32±1.0	59.36±0.9
Front parts[4]	33.48±0.5	34.93±0.6	33.19±0.4	32.43±0.5	32.44±1.1
Hind parts[4]	28.46±0.2	27.94±0.6	28.57±0.2	28.89±0.9	26.91±0.6
Total edible parts[5]	66.24±0.7	67.08±0.9	66.34±0.4	65.86±1.0	63.78±0.9

A, b: means bearing different superscripts are significantly different (P≤0.05).
♠: L. S. denotes to level of significance; * P≤0.05; NS, not significant.
[1]: LBW = Live body weight, just prior to slaughter, in grams.
[2]: Giblets % = Liver % + Gizzard % + Heart %.
[3]: Dressed carcass %= Total carcass (without head, legs, abdominal fat, viscera and lungs) as percent of live body weight.
[4]: Front parts = breast, wings and neck; hind parts = thighs, drumsticks and back.
[5]: Total edible parts % = Dressed carcass % + Giblets %.

The results of the current study are generally in line with the findings obtained by Salih and Taha (1989); Özen and Erdem (1995) and Sherif *et al.* (1997) who found that dressing percentage, abdominal fat content and total edible parts were not significantly affected by using SFM in broiler diets.

Blood parameters

Blood parameters of pullets, which were measured in the present study, were selected to mirror the metabolic status of birds and to monitor their health sub-clinically. Data presented in Table 6 demonstrate that including SFM into growing pullet diets appeared to have no significant effects on any of the blood parameters studied (serum glucose, total protein, total lipids and cholesterol as well as activities of serum transaminases; AST and ALT). The absence of significant differences among the various dietary treatments with respect to blood measurements reported herein; which

coincided with corresponding mean values that fell within the normal physiological range, could be considered as an indication of normal metabolism and well health of the birds. These findings are in line with those obtained by El-Deek *et al.* (1999) who found no significant differences in serum total protein, albumin, globulin, total lipids, triglycerides or alkaline phosphatase, when SFM replaced up to 100% of soybean meal protein in growing pullet diets.

Table 6: Means ± standard errors of blood constituents and activities of serum AST and ALT enzymes for 21-wk-old Mamourah pullets fed diets containing graded levels of sunflower meal

Parameters*	Experimental diets				
	1 (control)	2	3	4	5
Glucose, mg/dL	250±9	262±11	257±6	262±10	257±9
Total protein, g/dL	4.27±0.3	4.12±0.2	4.46±0.1	4.01±0.1	4.04±0.2
Total lipids, g/L	5.98±0.2	5.65±0.3	6.61±0.3	5.55±0.1	6.03±0.3
Cholesterol, mg/dL	112±8	124±4	129±6	114±12	113±8
AST, U/L	122±3	126±4	123±3	122±3	123±2
ALT, U/L	7±1.0	6±1.2	6±2.0	6±1.2	6±1.2

***: No significant differences were observed among treatments in all parameters studied.**

With laying hens, Sherif *et al*. (2001) observed no significant differences in the same blood parameters (serum glucose, total protein, total lipids and cholesterol as well as activities of serum transaminases; AST and ALT) due to dietary inclusion of SFM at levels of up to 27% of the diet. However, McNaughton (1978) reported significant reductions in plasma triglycerides and liver cholesterol but not in plasma cholesterol when SFM level increased from 10.63 to 30.07% of the diet. Generally, the inconsistent responses in blood parameters of birds fed SFM-containing diets may be attributable to age and breed differences and/or type and level of SFM used in the experimental diets.

Regardless of dietary treatments and breed or strain differences of chickens, the results of blood constituents obtained herein are consistent with those reported by Freeman (1984), Raya *et al*. (1989a) and Cerolini *et al.* (1990).

CONCLUSION

Based on the results of this study, it can be concluded that growing pullets could utilize dietary sunflower meal up to 23% of the diet (100% in place of soybean meal) as economically as soybean meal without any detrimental effects on their health status or growth performance.

REFERENCES

Abou-Raya, A. K. and A. Gh. Galal (1971). Evaluation of poultry feeds in digestion trials with reference to some factors involved. U.A.R. (Egypt), Animal Production, 11: 207-221.

Afifi, M. A. (1972). Sunflower seed meal as a substitute for soybean meal in broiler rations. Arch. Geflügelk., 4: 129-134.

Allain, C. A.; L. S. Poon; C. S. G. Chang; W. Richmond and P. C. Fu (1974). Enzymatic determination of total serum cholesterol. Clinical Chemistry, 20: 470-475.

Association of Official Analytical Chemists (1984). Official Methods of Analysis 14th Ed, A.O.A.C., Arlington, Virginia, USA.

Borland International, Inc., (1990). Quattro Program, Version 1.0

Cerolini, S.; A. Baldi and L. G. Cavalchini (1990). Blood and plasma biochemical variables in laying hens of different strains and ages. Arch. Geflügelk., 54: 190-194.

Cuca, M.; E. Avila and E. Sosa (1973). Threonine supplementation to diets for chicks. Poultry Science, 52: 2016-2017.

El-Deek, A. A.; M. A. Abaza; M. Osman; Y. A. Attia and A. M. Khalaf (1999). Inclusion of sunflower meal and commercial enzymes to egg type strain ration during growth period. 1- Effects on growth performance, mortality rate, blood parameters and economic returns. Egyptian Poultry Science Journal, 19: 529-547.

Freeman, B. M. (1984). Appendix: Biochemical and physiological data. In Physiology and Biochemistry of the Domestic Fowl. Vol. 5: pp: 407-424, B. M. Freeman, Ed, Academic Press, London, UK.

Frings, C. S. and R. T. Dunn (1970). A colorimetric method for determination of total serum lipids based on the sulfo-phosphovanillin reaction. Amer. J. Clin. Pathol., 53: 89-91.

Gippert, T. (1994). Some current questions of the broiler chicken nutrition. 3rd International Symposium of Animal Nutrition, Kaposvár, pp 43-52.

Green, S.; S. L. Bertrand; M. J. C. Duron and R. Maillard (1987). Digestibilities of amino acids in soyabean, sunflower and groundnut meals, determined with intact and caecectomised cockerels. Brit. Poultry Sci., 28: 643-652.

Hegedüs, M and S. Fekete (1994). Nutritional and animal health aspects of the substitution of soybean meal with sunflower meal. (In Hungarian) Magyar Állatorvosok Lapja, 49: 597-604.

Henry, R. J. (1964). Clinical Chemistry: Principles and Technics, Harper and Row Publishers, New York.

Jakobsen, P. E.; K. Gertov and S. H. Nielsen (1960). Fordøjelighedsforsøg med fjerkrae. “Digestibility trials with poultry) 1. Fordø jelseskanalen hos høns samt metodiske problemer ved gennemførelsen af fordøjelighedsforsøg. 322 beretning fra forsøgslaboratoriet, København.

McNaughton, J. L. (1978). Effect of dietary fiber on egg yolk, liver and plasma cholesterol concentrations of the laying hen. J. Nutr., 108: 1842-1848.

Michel, J. N. and M. L. Sunde (1985). Sunflower meal in pullet developer diets. Poultry Science, 64: 669-674.

Özen, N. and H. Erdem (1995). Replacement of soybean meal by sunflower meal in broiler diets supplemented with synthetic lysine and methionine. Poultry Abstracts, 21(8): 274.

Rad, F H. and K. Keshavarz (1976). Evaluation of the nutritional value of sunflower meal and the possibility of substitution of sunflower meal for soybean meal in poultry diets. Poultry Science, 55: 1757-1765.

Ravindran, V. and R. Blair (1992). Feed resources for poultry production in Asia and the Pacific. II. Plant protein sources. World's Poultry Sci. J. 48: 205-231.

Raya, A. H.; M. M. Khalifah and Kh. El. Sherif (1989a). Influence of dietary protein level on the performance of growing Dokki-4 and Rhode Island Red chickens. 1-Effects on growth rate, feed conversion, meat composition and blood constituents. Egyptian Poultry Sci., 10: 179-205.

Raya, A. H.; T. Gippert; L. Halmágyi and S. Hèjja (1989b). The possibilities of using sunflower meal to replace soybean meal in broiler rations and its effect on the performance of chicks and nutrient digestibility. Journal of Agricultural Science, Mansoura University, 14 (2): 1336-1348.

Reitman, S. and S. Frankel (1957). A colorimetric method for the determination of serum glutamic oxaloacetic and glutamic pyruvic transaminases. American. J. Clin. Path., 28: 56-63.

Rockville (1991). Statgraphics program, version 5.0 STSC.

Rose, R. J.; R. N. Coit and J. L. Sell (1972). Sunflower seed meal as a replacement for soybean meal protein in laying hen rations. Poultry Science, 51: 960-967.

Russom, W. C.; R. W. Seerley; R. S. Lowrey and H. C. McCampbell (1972). Sunflower meal as a protein for swine and rats. J. Anim. Sci., 35: 223.

Salih, F. I. M. and S. H. Taha (1989). Sunflower seed meal as a protein concentrate in diets for broiler chicks. Sudan J. Anim. Prod., 2(1): 27-33.

Sherif, Kh. El.; D. Gerendai and T. Gippert (1997). Complete substitution of sunflower meal for soybean meal with or without enzyme supplementation in broiler rations. Arch. Geflügelk., 61(1): 8-14.

Sherif, Kh. El.; M. H. Rabie; M. A. A. Hussein; M. G. Kassem and A. M. Abbas (2001). Performance of laying hens fed diets containing graded levels of sunflower meal. J. Agric. Sci. Mansoura University, 26 (9): 5293-5305.

Trinder, P. (1969). Determination of glucose in blood using glucose oxidase with an alternative oxygen acceptor. Ann. Clin. Biochem, 6: 24-27.

Vieira, S. L.; A. M. Jr. Penz; E. M. Leboute and J. Corteline (1992). A nutritional evaluation of a high fiber sunflower meal. Journal of Applied Poultry Research, 1: 382-388.

Villamide, M. J. and L. D. San Juan (1998). Effect of chemical composition of sunflower seed meal on its true metabolizable energy and amino acid digestibility. Poultry Sci., 77: 1884-1892.

Zatari, I. M. and J. L. Sell (1989). Utilization of sunflower meal in broiler diets. Effect of fat and pelleting. Feed Manage., 40: 17-26.

استخدام مستويات متدرجة من كسب عباد الشمس في علائق بداري البيض النامية

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أجريت هذه الدراسة لبحث تأثيرات استخدام مستويات متدرجة (صفر، ٥,٧٥، ١١,٥، ١٧,٢٥، ٢٣,٠٠% من العليقة) من كسب عباد الشمس علي المظاهر الإنتاجية لبدارى المعمورة النامية. تم استخدام عدد ٣٠٠ من البدارى النامية عمر ١١ أسبوع. تم تقسيم الطيور إلي خمسة مجاميع تجريبية بكل منها ٦٠ طائر في ثلاثة مكررات متساوية وتم تسكينها في حظائر أرضية. تم تكوين خمسة علائق تجريبية متساوية في الطاقة الممثلة (حوالي ٢٨٠٠ ك كالوري/ كجم) والبروتين الخام (١٤%) وتم تقديمها للمجموعات التجريبية الخمسة من الطيور خلال الفترة من ١١ إلي ٢١ أسبوع من العمر. تم تحليل عينات ممثلة من كل من كسب عباد الشمس والعلائق التجريبية المختلفة وكذلك عينات ممثلة من الزرق لتقدير محتواها من المركبات الغذائية وحساب معاملات الهضم للعلائق التجريبية المختلفة. تم وزن الطيور علي فترات كل أسبوعين حتى نهاية التجربة وتم تسجيل استهلاك العلف وحساب الزيادة المكتسبة في وزن الجسم وكذلك التحول الغذائي لكل فترة وكذلك خلال الفترة التجريبية الإجمالية كما تم تسجيل معدلات النفوق وحساب تكلفة العلف المستهلك لكل طائر. عند عمر ٢١ أسبوع تم عمل اختبار ذبح لتقدير محصول ومكونات الذبيحة وفي نفس العمر تم أخذ عينات دم من الطيور الحية لتقدير محتويات سيرم الدم من كل من الجلوكوز والبروتين الكلي والدهون الكلية والكولسترول وكذلك نشاط إنزيمي أسبرتيت-أمينوترانسفيريز (AST) و ألانين-أمينوترانسفيريز (ALT) في السيرم.

من التحليل الإحصائي للنتائج اتضح عدم وجود فروق معنوية بين المعاملات التجريبية المختلفة في أي من معايير المظاهر الإنتاجية (وزن الجسم – الزيادة المكتسبة في الوزن – استهلاك العلف – التحول الغذائي – معدل النفوق)، خصائص الذبيحة (باستثناء ملاحظة زيادة معنوية في الدهن البطني للطيور التي غذيت علي المستويين ١٧,٢٥، ٢٣% من كسب عباد الشمس مقارنة بباقي المعاملات التجريبية). كذلك لم يلاحظ فروق معنوية بين العلائق التجريبية المختلفة في معاملات هضم العناصر الغذائية أو بين مجاميع الطيور في قياسات الدم المنوطة بالدراسة. وبناء علي هذه النتائج يمكن استنتاج أن البدارى النامية يمكنها الاستفادة – من الناحية الغذائية والاقتصادية - من كسب عباد الشمس حتى مستوي ٢٣% من العليقة (ليحل محل كسب فول الصويا كلية في العليقة) دون أي تأثيرات سلبية علي الحالة الصحية أو المظاهر الإنتاجية خلال فترة النمو.