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PRODUCTIVITY RESPONSE OF BROILER BREEDER HENS WHEN FED PRACTICAL OR VEGETABLE DIETS CONTAINING HIGH LEVELS OF BARLEY, SUNFLOWER MEAL OR BARLEY AND SUNFLOWER MEAL WITHOUT OR WITH ENZYME MIXTURE SUPPLEMENTATION: 3 - BARLEY AND UN-DEHULLED SUNFLOWER MEAL

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ABSTRACT

Barley and sunflower meal was evaluated using vegetable (plant) and practical diets for broiler breeder hens, in which 0, 30 and 60% of yellow corn metaboilzable energy (YCME), as well as of soybean meal protein (SBMP) was replaced by the same percentage of barley metaboilzable energy (BME) and sunflower meal protein (SFMP) in the same diet, respectively. Each level of barley and sunflower meal containing-diet was fed, to two replicates of 9 hens plus one male each, without or with multi-enzyme mixture (Optizyme-p5). Diets were fed during the pre-laying (22-26 wk) and laying period (27-50 wk of age).

BME and SFMP as well as enzyme or type of diet had no negative effects on weight gains; age at 50% and peak production and egg weight at 50% production. Feeding plant diet significantly reduced age at peak production when compared to the practical diet. Increasing NSP(s) concentration by using barley and sunflower meal in broiler breeder hen diets had no negative effects on egg number, egg weight, egg mass, number of hatched chicks, feed/hatched chicks, nonetheless, improved economic efficiency significantly. This was confirmed by the lack of the negative effect of barely and sunflower meal NSP(s) on digesta passage time.

Level of BME and SFMP and enzyme addition resulted in no adverse impacts on egg shape index, yolk lipid and shell qualities parameters. Nonetheless, increasing level of BME and SFMP linearly decreased yolk color. Feeding practical diet increased egg shape index and improved yolk color, yolk lipid and quality of the eggshell. It was shown that feeding plant diets containing up to 60% BME and 60% SFMP had no adverse effects on fertility, hatchability and number of hatched chicks. Digesta passage time and serum cholesterol was significantly decreased when plant diets were fed. In conclusion, BME and SFMP could be included at 60% of the classical energy and protein sources in the diets for broiler breeder hens, respectively during the pre-laying and laying phases without negative effects on productive and reproductive performance whilst improved economic efficiency.

Keywords: broiler breeders, barley and sunflower meal, enzyme, egg production, feed conversion.

INTRODUCTION

As indicated in the combined papers (El-Deek *et al.*, 2002 a; b), the use of barley and sunflower meal in laying hen diets was reviewed (Jeroch and Dänicke, 1995; Senkoylu and Dale, 1999). Francesch *et al.* (1994) fed laying hens a diet based on 42% barley and 14% sunflower meal containing

16% NSP without or with Roxazyme-G. They showed that insignificant interaction between diet and enzyme supplementation in all of the productive parameters. Feed intake, feed efficiency, dirty eggs and body weight gain were affected by diet and enzyme improved feed utilization and reduced dirty eggs significantly. Francesch *et al.* (1995) conducted a trial in which laying hens fed diet containing 60% barley and 20% sunflower meal without or with Grindzyme GP-5000 (β-glucans, xylanase, and pectinase) at 0, 0.5, 0.75 and 1.0 g/kg diet. They showed that enzyme improved egg weight by more than 1 g and reduced the percentage of dirty eggs during the four wk of laying. However, enzyme had no significant effect on the rate of laying, daily feed intake, and body weight gain. These results confirm that enzyme supplementation to laying hen diets could be very useful in the early part of the laying period, when small egg size is an important economic problem.

Results by El-Deek *et al.* (2003a), and Francesch *et al.* (1995) suggested that the use of exogenous enzyme might allow increasing flexibility in dietary formulation for laying hens by permitting higher concentration of barley and sunflower meal than in conventional diets without such enzymes. Such flexibility in dietary formulation allows reduced costs when barely and sunflower meal are cheaper than other competitive ingredients and may result in lower cost of feeding depending on ingredient prices. Thereby, this work aimed to investigate the productive and reproductive performance responses of broiler breeder hens to the addition of multienzymes mixture when fed vegetable (plant) or practical diets containing high levels (0, 30 and 60%) of BME and SFMP.

MATERIALS AND METHODS

Birds, housing and management

This work was carried out in British Egyptian Hatcheries company farms, El-Amria, Alexandria, Egypt. Hubbard broiler breeder hens were kept in floor pens (1.5m × 2.5m) under similar managerial and hygienic conditions. A mash form of feed and water were offered *ad libitum* from tube feeders and automatic nipple drinkers, respectively with a sixteen hours lighting program 22.6 lux of incandescent light measured at bird heads. Each treatment group consisted of 18 hens subdivided randomly into 2 replicates of nine hens and one male each during the pre-laying 22-26 wk of age and laying 27-50 wk of age. The hens were distributed to the experimental groups keeping approximately equal initial body weight. The average temperature in the layer house was 28.3±1.3 °C during the experimental period.

Design and Diets

A three by two by two experimental design in which barley and sunflower was used as an energy and protein sources, respectively to substitute 0%, 30% and 60% of the energy provided by yellow corn and the same percentage provided by soybean meal protein. Within each barley and sunflower meal level, two types of diet were used, plant or practical diet. Each diet was fed without or with multi-enzyme mixture (Optizyme-p5[1])

[1] A product of Optivite International LTD, Main Street, Laneham, Retford, Nottinghamshire, DN22 ONA, England, and composed mainly of multi-enzyme systems proteases, amyloglucosidase, xylanase, β-gluconase, cellulases and hemicellulases.

supplementation at 1.0 kg per ton diet. The experimental diets (Tables 1; 2) were fed during the pre-laying 22-26 wk of age and laying period 27-50 wk of age. Diets were formulated and fed according to Hubbard breeder guide. The composition of the experimental diets was based on NRC (1994) tabulated values for feedstuffs.

Observations

Digesta passage time was measured according to Almirall and Esteve- Garcia (1994) every two wk throughout the experimental period. The hens were fasted for 12 hr and then given the treatment diet in which was supplemented with ferric oxide as a marker at rate of 0.1%. The color of the feces was observed every ten minuets to determine the time for the marker to pass through the digestive system.

Table 1. Composition of the pre-laying diets fed during 22-26 wk of age

Ingredients and composition, %	Barley energy and sunflower meal protein					
	0.0		30%		60.%	
	Type of diet					
	Plant	Practical	Plant	Practical	Plant	Practical
Yellow corn	63.608	64.450	42.20	42.10	11.55	18.00
Barley	0.0	0.0	24.00	25.00	48.00	50.00
Soybean meal (48%)	23.40	14.90	15.60	9.30	9.00	4.00
Sunflower meal	0.00	0.00	11.00	7.00	22.00	14.00
Protein concentrate[1]	0.0	10.0	0.0	10.0	0.0	10.0
Lime stone	0.835	0.0	0.900	0.0	1.00	0.0
Bone meal	2.500	0.0	2.300	0.0	2.000	0.0
NaCl	0.267	0.0	0.300	0.0	0.350	0.0
Vit+Min Mix[2]	0.400	0.0	0.400	0.0	0.400	0.0
DL-methionine	0.220	0.0	0.180	0.0	0.150	0.0
L-lysine-HCl	0.300	0.0	0.300	0.0	0.360	0.0
Corn oil	0.0	0.0	1.00	1.20	5.19	3.00
Washed sand	8.470	10.650	1.82	5.40	0.0	1.00
Total	100.0	100.0	100.0	100.0	100.0	100.0
AME_n kcal/kg	2750	2751	2753	2751	2752	2753
CP, %[3]	17.01	17.07	17.08	17.02	17.01	17.01
Methionine, %[4]	0.489	0.452	0.482	0.470	0.477	0.488
TSAA, %[4]	0.788	0.743	0.802	0.777	0.809	0.810
Lysine, %[4]	1.12	1.00	1.08	0.97	1.10	0.94
Calcium, %[3]	1.21	1.28	1.22	1.30	1.21	1.33
Av. P, %[4]	0.45	0.42	0.45	0.44	0.43	0.46
Crude fiber, %[3]	2.31	2.11	4.84	4.04	7.21	5.94
Crude fat, %[3]	2.68	3.28	3.51	4.22	7.19	5.70

* Added as L-lysine-HCl the adjustment was made by changing sand content in the experimental diet.

[1] Protein concentrate consists of 28% meat and bone meal (57% CP), 31.5% meat and bone meal (60% CP), 2.0% fish meal, 4.0% Vit +Min Mix, and contains 2288 kcal ME/kg diet, 45% CP, 1.11% CF, 6.87% EE, 12.22% Ca, 3.28% available P, 2.36% methionine, 2.94% TSAA, 4.02% lysine, 2.56% arginine, 0.70% tryptophan , 2.70% salt (NaCl) and 0.173% Linoleic acid.

[2] Vit+Min mixture provides per kilogram of diet: vitamin A, 5.500 IU; vitamin E, 11.0 IU; menadione , 1.1 mg; Vit. D_3, 1.100 ICU; riboflavin, 4.4 mg; Ca pantothenate, 12 mg; nicotinic acid, 44 mg; choline chloride, 191 mg; vitamin B_{12}, 12.1 µg; vitamin B_6, 2.2 mg; thiamine, 2.2 mg; folic acid, 0.55 mg; d-biotin, 0.11 mg. Trace mineral (milligrams per kilogram of diet): Mn, 60; Zn, 50; Fe, 30; Cu,5; Se, 0.30.

[3] determined value [4] calculated value

Table 2. Composition of the laying diets fed during 27-50 wk of age

Ingredients and composition, %	Barley energy and sunflower meal protein					
	0.0		30%		60.%	
	Type of diet					
	Plant	Practical	Plant	Practical	Plant	Practical
Yellow corn	61.0	61.50	29.80	37.68	0.0	4.20
Barley	0.0	0.0	23.65	25.70	46.0	51.30
Soybean meal (48%)	26.80	16.60	19.68	11.13	12.94	7.60
Sunflower meal	0.0	0.0	11.60	6.54	22.0	13.0
Protein concentrate[1]	0.0	10.0	0.0	10.0	0.0	10.0
Lime stone	7.65	6.00	7.32	5.30	6.65	6.15
Bone meal	2.00	0.0	1.87	0.0	1.70	0.0
NaCl	0.25	0.0	0.26	0.0	0.31	0.05
Vit+Min Mix.[2]	0.400	0.0	0.400	0.0	0.400	0.0
DL-methionine	0.100	0.0	0.070	0.0	0.150	0.0
L-lysine-HCl	0.0	0.0	0.00	0.0	0.150	0.0
Corn oil	1.0	1.1	5.35	2.55	9.70	7.34
Washed sand	0.80	4.80	0.0	1.10	0.0	0.36
Total	100.0	100.0	100.0	100.0	100.0	100.0
AME_n kcal/kg	2752	2754	2750	2750	2758	2750
CP, %[3]	17.04	17.04	17.00	17.05	17.01	17.05
Methionine, %[4]	0.383	0.454	0.378	0.470	0.476	0.480
TSAA, %[4]	0.678	0.737	0.690	0.771	0.801	0.795
Lysine, %[4]	0.93	1.03	0.89	1.00	0.98	1.00
Calcium, %[3]	3.60	3.50	3.43	3.27	3.22	3.70
Av. P, %[4]	0.41	0.43	0.40	0.45	0.40	0.46
Crude fiber, %[3]	3.22	2.63	5.42	4.31	7.40	5.90
Crude fat, %[3]	3.55	4.25	7.39	5.40	11.22	9.52

[1,2,3,4] As shown in Table 1.

Hubbard broiler breeder hens were leg banded, weighed at the beginning and at the end of the experiment. Age at 50% production was recorded, and hen-day egg production records were maintained throughout the trials. Individual egg weight records were done daily throughout the trial period. Total discredited eggs including soft, broken, cracked, misshapen, double yolk, small, pimpled, wrinkled and dirty were recorded daily and their percentage was calculated by dividing them on the total number of eggs produced. Settable eggs percentage was calculated as the difference between total and discredited eggs divided by total eggs laid and multiplied by 100. Feed conversion ratio as g feed required to produce one chick was calculated based on the averages of replicates. The economic efficiency was calculated as the price of chick hatched/hens –costs of feeding a hen as relative to feeding costs.

Egg quality measurements were carried out at monthly interval starting at 32 wk of age using 3 eggs /replicate. The eggs were weighed and egg quality measurements were carried out as outlined by Attia *et al.* (1995). Eggs were collected for seven days and stored at room temperature and then incubated (37.6° C dry bulb (DB), 55% relative humidity (RH) and hatched (36.8° C DB, 65% RH) in an automatic incubator. Eggs were candled at day 18, and those appeared infertile were removed and opened to differentiate infertiles from early dead embryos. All hatched chicks were counted and weighed and

fertility and hatchability of total eggs set were calculated. Serum cholesterol was determined according to the method of Ratliff and Hall (1973).

Statistical analysis:

Data were analyzed using three way ANOVA (three levels of barley and sunflower meal × two types of diets × two enzyme levels) using the GLM procedure of SAS®(SAS Institute, 1985) as well as Duncan's New-Multiple Range Test (Duncan, 1955) to test mean differences at P≤0.05.

RESULTS AND DISCUSSION

Productive performance of broiler breeder hens

Results presented in Table 3 indicated no effect of BME and SFMP as well as enzyme addition and type of diet, or the interaction between them on initial body weight and body weight gain for the whole experimental period. Jeroch and Dänicke (1995) and Benabdelijelil and Barkok (1996) found that barley had no negative effect on weight gains of laying hens. Also, Michel and Sunde (1985) and El Barbary (1997) found that sunflower meal had no detrimental impact on weight gains of laying hens.

Table (3): Effect of barley as an energy source as well as sunflower meal as a protein source and type of diet with or without enzyme supplementation on performance of broiler breeder hens during the pre-laying period (22-26 wk of age)

Barley energy and sunflower meal protein, %	Type of diet	Enzyme addition	Initial body weight	Age at 50% laying	Age at peak laying	Egg weight at 50% laying	Weight gains during 22-50 wk of age
0.0	Plant	-	2102	185.5	195.0	52.95	1502
	Plant	+	2124	188.5	211.0	50.85	1394
	Practical	-	2160	187.0	212.5	48.75	1305
	Practical	+	2135	190.0	211.0	51.50	1345
Average			2130	187.6^{a}	207.5	51.01^{b}	1386
30.0	Plant	-	2153	185.0	193.5	54.00	1317
	Plant	+	2153	183.5	196.0	52.90	1382
	Practical	-	2158	185.0	210.5	51.75	1332
	Practical	+	2124	185.0	220.5	53.15	1369
Average			2148	184.6^{ab}	205.1	52.95^{ab}	1350
60.0	Plant	-	2055	183.0	197.0	54.10	1342
	Plant	+	2083	183.0	194.0	53.85	1423
	Practical	-	2044	185.5	192.0	54.20	1510
	Practical	+	2055	180.5	209.0	54.10	1441
Average			2059	183.0^{b}	198.0	54.06^{a}	1429
Enzyme effect		-	2112	185.2	200.1	52.63	1385
		+	2113	185.0	207.0	52.73	1392
Type of diet effect		Plant	2112	184.7	197.8^{b}	53.11	1393
		Practical	2113	185.5	209.3^{a}	52.24	1384
SEM			41.8	1.84	1.11	1.84	69.2

$^{a-c}$Means within the same column not sharing common superscripts differ significantly P≤0.05.

Likewise, Attia *et al.* (1995; 1997) found that enzyme supplementation to laying hen diets had no effect on body weight and weight gains. Also, Rebolé *et al.* (1999) reported that enzyme addition to broiler diets containing 15% sunflower meal did not significantly improved digestibilities of protein/amino acid as well as fat/fatty acids and ME. There was no mortality in this study; therefore data were not presented.

Including BME and SFMP at 60% of energy and protein provided by corn and sunflower meal decreased age at 50% and increased egg weight at 50% significantly, and this was stabilized at 30% barley containing-diet (Table 4). Whilst, age at peak production was significantly decreased when plant diets was fed in comparison with the practical diets. Also, birds fed plant diet reached age at peak production significantly earlier than that fed practical diet. It is very well known that body weight and sexual maturity are positively correlated, as heavier birds reached matured earlier (Abd-El-Ghani, 1996). Optizyme had no beneficial effect on age at 50% and peak production as well as egg weight at 50% production. Also, enzyme addition, and type of diet did not affect egg weight at 50% production. These results are in contrary to those reported by Francesch *et al.* (1995) who found that enzyme addition to barley and sunflower meal based-diet for laying hens improved early egg weight by more than 1 g during the first wk of age. However, Rebolé *et al.* (1999) reported that enzyme addition to broiler diets containing 15% sunflower meal did not significantly improved digestibilities of protein/amino acid as well as fat/fatty acids and ME.

Level of BME and SFMP had no adverse effect on egg number, egg weight, egg mass and settable egg percentage (Table 4). Generally, egg number and egg mass was improved by including up to 60% BME and 60% SFME in the diets for broiler breeder hens. This was correlated with the lack of negative effect of barley and sunflower meal containing-diets on digesta passage time (Table 6), confirming the lack of the negative effect of barley and sunflower meal NSP (S) in productive performance of broiler breeder hens. In deed, digesta passage time of barley and sunflower meal containing-diet was faster than that of the control (Table 6). This may be due to the maturity of the digestive tract (gut capacity, microflora, enzymatic secretion) of laying hens to neutralize β-glucans of barley (Wyatt and Goodman, 1993, Jeroch and Dänicke, 1995) and\or barley variety used herein had low β-glucans content, as well NSP of sunflower meal (Senkoylu and Dale, 1999). Mirza and Sial (1992) and Senkoylu and Dale (1999) concluded that sunflower meal could replace 50-100% of soybean meal protein in layer diets, depending on the type of diet and the nature of the other ingredients. Moreover, Suresh *et al.* (2000) found that sunflower hulls at 60 or 120g/kg diet did not cause any adverse effect on the weight gain and livability of broilers, showing the lack of the negative effect of sunflower meal NSP on growth performance.

The present results indicated that broiler breeder hens could be fed plant diet containing up to 60% BME and 60% SFMP without adverse effect on productive performance. This indicates that increasing NSP concentration by using barley and sunflower in broiler breeder hen diets had no negative effect on performance of broiler breeder hens. This was confirmed in contrast

to our expectation, by the lack of the negative effect of plant diet on digesta passage time (Table 7). Almirall and Esteve- Garcia (1994), and Jeroch *et al.* (1995) who indicated that digesta passage time was negatively correlated with poor performance of birds and especially broilers.

Feed per hatched chick was not adversely affected by feeding barely and sunflower meal containing-diets. Enzyme supplementation and type of diet had insignificant effect on feed per hatched chicks. Economic efficiency of hens fed 60% BME and SFMP was significantly better than the control group (0% BME and SFMP), whilst that of 30% BME and SFMP was better than that of both groups (Table 4). Results demonstrated that plant diets had significantly 4.3% better economic efficiency than practical diets, and this was existed across most of the treatment groups. It could be concluded that BME at 60% and SFMP at 60% in broiler breeder hen plant diets (7.4% CF) during the pre-laying and laying periods had no adverse effects on productive performance, whilst improved economic efficiency.

Egg and shell quality parameters:

Obviously, level of BME and SFMP, and enzyme addition as well as the interaction between enzyme and barley and sunflower meal level or type of diet (Table 5) had no adverse effects egg shape index and criteria of shell quality. Likewise, Deaton *et al.* (1979), Uwayjan *et al.* (1983) and Jiang *et al.*(1992) found that shell quality was not affected by sunflower meal. Also, Brake (1992), Fayek *et al.* (1995), Attia *et al.* (1995; 1997) and Benabdelijelil and Barkok (1996) reported that enzyme addition had no effect on shell quality of eggs. Increasing barley and sunflower meal level linearly decreased ($P<0.05$) Roche color values compared to the control, and enzyme addition had no enhancing impacts either on yolk color, yolk lipid or shell quality measurements (Table 5). Also, Benabdeljelil and Arbaoui (1994) and Attia *et al.* (1997) revealed that enzyme addition to laying hen diets did not improve yolk color score.

It is also clear that practical diet showed significantly higher, egg shape index, yolk color, yolk lipid and shell percentage than plant diet, which may be due to higher dietary pigmentation, fat contents, and Ca availability of animal protein containing-diets.

Reproductive efficiency:

Evidently, level of BME and SFMP, enzyme addition, type of diet and the interaction among them exhibited insignificant effects on fertility, hatchability, and number of hatched chicks (Table 6). Also, these results partial agreed with those reported by Brake (1992) and Attia *et al.* (1997) who found that enzyme addition had no deteriorating effect on fertility and hatchability of total egg set.

Table (4): Effect of barley as an energy source as well as sunflower meal as a protein source and type of diet with or without enzyme supplementation on productive performance of broiler breeder hens during the laying period (27-50 wk of age)

Barley energy and sunflower meal protein, %	Type of diet	Enzyme addition	Egg number/hen	Settable egg /hen	Egg weight, g	Egg mass/hen	Feed per hatched chick, g	Economic efficiency, %
0.0	Plant	-	125.1	93.91	59.84	44.47	288.6	500.2
	Plant	+	115.0	93.17	59.56	40.95	321.9	431.1
	Practical	-	126.8	95.02	59.83	45.16	304.7	454.4
	Practical	+	120.3	94.70	59.72	42.81	337.6	403.9
Average			121.8	94.20	59.74	43.35	313.2	447.4[c]
30	Plant	-	126.1	92.83	60.11	45.03	308.3	483.9
	Plant	+	126.4	94.41	60.18	45.16	299.0	483.0
	Practical	-	124.2	94.29	60.01	44.34	293.6	480.6
	Practical	+	124.0	94.57	59.84	44.25	299.8	453.4
Average			125.2	94.03	60.04	44.70	300.2	475.2[a]
60	Plant	-	122.9	94.15	60.09	43.91	315.5	457.7
	Plant	+	123.3	95.48	60.08	44.03	300.1	464.7
	Practical	-	130.1	94.69	60.00	44.43	294.0	487.5
	Practical	+	121.8	94.33	60.10	43.49	319.6	425.4
Average			124.5	94.66	60.07	44.47	307.3	458.8[b]
Enzyme effect		-	125.9	94.15	59.98	44.89	299.7	477.4
		+	121.8	94.44	59.91	43.45	309.6	443.6
Type of diet effect		Plant	123.1	93.99	59.98	43.92	305.6	470.1[a]
		Practical	124.6	94.60	59.92	41.41	303.7	450.9[b]
SEM			4.16	1.06	0.88	1.51	7.28	1.53

[a-c]Means within the same column not sharing common superscripts differ significantly P≤0.05

Results showed that no significant impact of either BME or SFMP or addition of multienzymes on serum cholesterol. However, results indicated that feeding practical diet increased total serum cholesterol might be due to higher saturated fatty acids of meat meal of protein concentrate. El-Deek *et al.* (1997) found similar results.

Reproductive efficiency was not significantly affected by BME and SFMP; thereby they could be included up to 60% of YCME and 60% of SBMP without adverse effect on reproductive efficiency. All in all results indicate that broiler breeder hens could be fed diets containing up to 60% BME and SFMP without adverse effects on productive and reproductive performances and egg and shell quality parameters whilst improved economic efficiency.

Table (5): Effect of barley as an energy source as well as sunflower meal as a protein source and type of diet with or without enzyme supplementation on egg quality parameters of broiler breeder hens during the laying period (27-50 wk of age)

Barley energy and sunflower meal protein, %	Type of diet	Enzyme addition	Egg shape index	Yolk color	Yolk lipid	Shell, %	SWUSA, mg/cm^2
0.0	Plant	-	76.0	4.75	60.92	8.97	78.3
	Plant	+	77.4	5.04	62.20	8.99	77.3
	Practical	-	77.7	4.79	62.40	9.36	81.4
	Practical	+	76.5	5.13	63.19	9.17	79.6
Average			76.9	4.93^a	62.18	9.12	79.2
30	Plant	-	77.8	3.71	60.66	8.90	78.7
	Plant	+	75.4	3.88	60.25	8.84	77.2
	Practical	-	76.7	3.83	61.90	9.15	79.7
	Practical	+	77.9	3.42	62.62	9.03	78.1
Average			76.9	3.71^b	61.38	8.98	78.4
60	Plant	-	77.9	1.83	59.37	9.16	80.5
	Plant	+	76.7	1.98	59.73	8.76	76.7
	Practical	-	78.8	2.29	62.36	9.19	80.1
	Practical	+	76.2	2.04	63.43	9.14	79.7
Average			77.4	2.04^c	61.22	9.06	79.3
Enzyme effect		-	77.5	3.54	61.27	9.12	79.8
		+	76.7	3.58	61.24	8.99	78.1
Type of diet effect		Plant	76.9^b	3.53^b	59.86^b	8.94^b	78.1
		Practical	77.3^a	3.58^a	62.65^a	9.17^a	79.8
SEM			0.86	0.20	0.25	0.20	1.69

$^{a-c}$Means within the same column not sharing common superscripts differ significantly P≤0.05

Table (6): Effect of barley as an energy source as well as sunflower meal as a protein source and type of diet with or without enzyme supplementation on reproductive performance of broiler breeder hens during the laying period (27-50 wk of age)

Barley energy and sunflower meal protein, %	Type of diet	Enzyme addition	Fertility, %	Hatchability, %	No of hatched chicks	Digesta passage time (min)*	Serum cholesterol, mg/100ml*
0.0	Plant	-	90.2	85.1	100.0	112.8	182.5
	Plant	+	89.2	85.4	91.8	112.8	151.7
	Practical	-	85.1	78.6	94.4	124.0	193.6
	Practical	+	84.1	74.8	85.2	130.0	167.0
Average			87.1	81.0	92.9	120.0[a]	173.6
30	Plant	-	81.6	79.2	92.5	96.0	155.3
	Plant	+	85.8	80.4	95.8	97.8	162.0
	Practical	-	90.0	83.6	98.0	102.6	206.0
	Practical	+	90.0	82.3	96.6	94.8	185.5
Average			86.9	81.4	95.7	97.8[b]	177.2
60	Plant	-	80.3	78.4	99.7	98.4	178.8
	Plant	+	85.7	80.8	95.1	98.4	175.0
	Practical	-	84.4	78.8	97.1	103.8	192.8
	Practical	+	82.6	78.3	89.9	100.8	212.8
Average			83.3	79.1	93.2	100.8[b]	189.8
Enzyme effect		-	85.3	78.1	95.8	106.2	184.8
		+	86.2	80.4	93.3	105.0	174.3
Type of diet effect		Plant	85.5	79.1	94.3	102.6[b]	166.1[b]
		Practical	86.0	79.4	94.8	108.6[a]	192.9[a]
SEM			2.67	2.90	0.83	10.4	3.97

[a-c] **Means within the same column not sharing common superscripts differ significantly P≤0.05**

REFERENCES

Abd-El-Ghani, I. A. (1996). Influence of body weight and strain on productive and reproductive performance of some new developed Egyptian chickens. Egyptian Poultry Sci. J., 16 (III):601-618.

Almirall, M., E., and Esteve- Garcia (1994). Rate of passage of barley diets with chromium oxide: Influence of age and poultry strain and effect of β-gluncanase supplementation. Poultry Sci., 73:1433- 1440.

Attia, Y. A., Mona Osman, and Marft Salah El-Din (1995). Effect of enzyme mixture treatment on performance and nutrient digestibilities of Alexandria layers fed diets containing different levels of whole rice milling by product, PP., 230-248 in: Proc. First Egyptian-Hungrain Conference in Poultry Production, Alexandria, Egypt.

Attia, Y. A., A.I. Abd El-Ghani, E. H. El-Ganzory and S. B. Abd El-Hady (1997).Responses of Bandarah local breed to some pronutrient additions". Egyptian Poultry Sci., 17 (II):1-22.

Benabdeljelil, K., and M.I. Arbaoui (1994). Effect of enzyme supplementation of barley-based diets on hen performance and egg quality. Animal Feed Science and Technology., 48:325-334.

Benabdeljelil, K., and A. Barkok (1996). Influence of enzyme supplementation of barley-based diets on laying hens performance and egg quality. Egyptian J.Animal Production., 33:163-174.

Brake, J.T. (1992). Egg production of broiler breeders increases when fed diets containing commercial enzyme preparations- possible method to improve performance in hot climates. Proc. 19 th World's Poultry Congress, Amsterdam 19-24 Sep, 1992.

Deaton, J. W., J. W. McNaughton, and D. Burdick (1979). High- fiber sunflower meal as a replacement for soybean meal in layer diets. Br. Poult. Sci., 20:159-162.

Duncan, D. B., (1955). Multiple range and multiple F tests.Biometrics,11:1-42.

El-Barbary A. (1997). Effect of sunflower seed meal (Helianthus annuus) as feed replacement for layer ration on some physiological parameters and reproductive performance. M.Sc. Thesis, Faculty of Agriculture, Alexandria University.

El-Deek,, A.A.; M. Barakat; Y.A., Attia and A. El-Sebeay (1997). Effect of feeding Muscovy ducklings different protein sources on performance, omega –3 fatty acid content, and acceptability of Muscovy ducks tissues. J. American Oil Chemists Society (JAOCS), 72 (8):999-1009.

El-Deek, A. A.; M. A. Asar; Y. A. Attia and Amal A. Soliman (2003a). Productivity response of broiler breeder hens to enzyme supplementation when fed practical or plant diets containing high levels of barley, sunflower meal or barley and sunflower meal 1-Barley. Egyptian Poultry Sci., 23:(in press)

El-Deek, A. A.; G. E. Hassan; Y. A. Attia and Amal A. Soliman (2003b). Productivity response of broiler breeder hens to enzyme supplementation when fed practical or plant diets containing high levels of barley, sunflower meal or barley and sunflower meal 2-Un-dehulled sunflower meal. J. of Agric. Sci. Assuit University (In press).

Francesch, M.; A.M. Pérez-Vendrell; E. Esteve-Garcia; A. Miquel, and J. Brufau (1994). Laying hen performance affected by the supplementation of crude enzyme preparation. Poultry Science, 73 (Suppl. 1):379 (Abst.).

Francesch, M.; A.M. Pérez-Vendrell; E. Esteve-Garcia and J. Brufau (1995). Enzymes supplementation of barley and sunflower-based diet on laying hen performance. J. Appl. Poultry Res., 4:32-40.

Fayek, H. M.; M. A. Abou El-Ella, Y. Attia and Y.A.Mady (1995). Evaluation of using some feed additives in layer diets. Sci Conf. Animal Nutrition, Vol 1:313-321.

Jiang, D. U. Shn, L. Ladner, and J. S. Sim, (1992). Influence of feeding full-fat flax and sunflower seeds on internal and sensory qualities of eggs, Poultry Sci., 71: 378-382.

Jeroch, H. and S. Dänicke (1995). Barley in poultry feeding: a review. World's Poult. Sci. J, 51:271-290.

Jeroch, H.; S. Dänicke and J. Brufau (1995). The influence of enzyme preparations on the nutritional value of cereals for poultry: a review. J. Anim. and Feed Sci., 4: 263-285.

Mirza, M. A. and M.A. Sial (1992) Sunflower meal as a major plantprotein source in layers' ration. Arch. Anim. Nutr., 42:273-277.

National Research Council, NRC (1994). Nutrient Requirements of Poultry. 9th Ed. National Academy press. Washington DC, USA.

SAS Institute (1985). SAS® User's Guide: Statistics. Version 5 Ed., SAS Institute Inc., Cary, NC., USA.

Senkoylu, N., and N. Dale (1999) Sunflower meal in poultry diets: a review. World's Poult. Sci. J., 55:153-174.

Suresh, B.V.; V. R. Reddy and A. R. Reddy (2000). Effect of dietary dilution with sunflower seed hulls on the performance of broilers. Archiv Fur Geflugelkunde, 64 (4): 162-166.

Ratliff, C. R., and F. Hall (1973). Laboratory Manual of Clinical Biochemistry, Scott and White Memoraial Hospital Publications Office, Temple, Tx, USA.

Rebolé, A. M.; L. Rodriíguez; C. Alzueta; L. T. Ortiz and J. Treviño (1999). A short note on effect of enzyme supplement on the nutritive value of broiler chick diets containing maize, soybean meal and full-fat sunflower seed. Anim. Feed Sci. and Tech., 78:153-158.

Wyatt, C. I., and T. N. Goodman (1993). Utilization of feed enzyme in laying hen rations. J. Appl. Poultry Res., 2:68-74.

Uwayjan, M. G.; E. J. Aar and N. J. Daghir (1983). Sunflower seed in laying hens rations . Poultry Scie., 62 : 1247-1253.

إنتاجية أمهات كتاكيت اللحم عند التغذية علي علائق نباتية أو تجارية تحتوي علي مستويات مرتفعة من الشعير أو كسب عباد الشمس أو كليهما معا أو بدون مخلوط الأنزيمات :٣- تأثير الشعير و كسب عباد الشمس معا

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استهدفت هذه الدراسة تقييم الشعير و كسب عباد الشمس كمواد علف بديلة للذرة و كسب فول الصويا في علائق أمهات كتاكيت اللحم النباتية و التجارية عند التغذية عليه بدون أو في وجود مخلوط الإنزيمات التجارية (اوبتزيم-ب٥) بحيث حل الشعير و كسب عباد الشمس محل صفر، ٣٠ و ٦٠% من طاقة الذرة الصفراء و نفس النسبة من بروتين كسب فول الصويا (٤٤% بروتين) في ذات العليقة، وغذيت العلائق في فترتي ما قبل إنتاج البيض ٢٢-٢٦أسبوع من العمر ومرحلة إنتاج البيض ٢٧-٥٠أسبوع من العمر و أوضحت النتائج التالي:-

١- لم يؤثر استخدام الشعير و كسب عباد الشمس في علف أمهات كتاكيت اللحم تأثير سلبيا علي الزيادة في وزن الجسم أو العمر عند ٥٠% إنتاج أو عند قمة الإنتاج ولم تؤثر الإنزيمات أيضا علي الصفات المذكورة، ولكن انخفض العمر عند قمة الإنتاج معنويا باستخدام العلائق النباتية بالمقارنة بالعلائق التجارية التي تحتوي علي مصادر للبروتين الحيواني.

٢- لم تؤثر طاقة الشعير و بروتين كسب عباد الشمس عند إحلالهما محل طاقة الذرة و بروتين كسب فول الصويا على عدد البيض، و كتلة البيض، و عدد الكتاكيت الفاقسة/ألام، و كمية الغذاء اللازمة لكل كتكوت فاقس ولم تتأثر تلك الصفات أيضا بإضافة الإنزيم أو نوع العلف.

٣- لم يؤثر مستوي الشعير و كسب عباد الشمس أو الأنزيمات أو التداخل بينهم علي جودة البيض أو القشرة بينما انخفض لون الصفار معنويا بزيادة مستوي الشعير و كسب عباد الشمس بالعلف.

٤- أدى استخدام العلائق النباتية إلى تحسين الكفاءة الاقتصادية معنويا عند المقارنة بالعلائق التجارية المحتوية علي مصادر للبروتين الحيواني كما أدى استخدام العلائق المحتوية علي الشعير و كسب عباد الشمس بمستوي٦٠% سواء من طاقة الذرة أوبروتين كسب فول الصويا إلى تحسين معنوي في الكفاءة الاقتصادية.

٥- أدى استخدام العلائق التجارية المحتوية علي مصادر للبروتين الحيواني إلى زيادة دليل الشكل للبيضة، و لون الصفار ونسبة الدهن بالصفار، و معدل مرور الغذاء في القناة الهضمية، والكولسترول في سيرم الدم.

٦- لم تؤثر العلائق النباتية المحتوية علي مستويات مختلفة من الشعير و كسب عباد الشمس علي الخصوبة و الفقس.

٧- أوضحت النتائج انه يمكن استخدام الشعير و كسب عباد الشمس في العلائق النباتية لأمهات كتاكيت اللحم بمستوي ٦٠% من طاقة الذرة و بروتين فول الصويا خلال مرحلة ما قبل إنتاج البيض و في مرحلة إنتاج البيض بدون تأثيرات ضارة علي إنتاجية الطيور و صفاته التناسلية الأمر الذي يوفر بدائل للعلائق التقليدية المعتمدة علي الذرة الصفراء و كسب فول الصويا عند الأزمات.