Dept. of Animal and Poultry Production,

Fac. of Agriculture Assiut University, Assiut, Egypt.

USING DATE SEED MEAL IN DANDARAWI LAYING HENS AND GROWING COCKERELS DIETS

(With 7 Tables)

By

H.A. MAHMOUD

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إستخدام مسحوق نوى البلح فى علائق الدجاج البياض وديوك الدندراوى النامية

حسين عبد الفتاح محمود

أجريت تجربتين لدراسة تأثير مستويات مختلفة من مسحوق نوى البلح للدجاجات البياضة وديوك الدندراوى النامية. أستخدم ١٢٠ دجاجة عمر ٢٨ أسبوع للتجربة الأولى ووزعت الدجاجات عشوائيا على أربع مجاميع غذائية كل مجموعة احتوت على ٣٠ دجاجة موزعة على ٣ مكررات بكل مكررة ١٠ دجاجات. فى التجربة الثانية أستخدم ٢٤٠ طائر وزعت على أربع معاملات (٦٠ طائر لكل معاملة موزعة على ٣ مكررات بكل مكررة ٢٠ طائر). غذيت الطيور فى التجربتين عل ٤ مستويات من مسحوق نوى البلح بنسب صفر, ١٠, ٢٠ و٣٠%. أوضحت النتائج المتحصل عليها من التجربة

الأولى أن إدخال ٢٠% من مسحوق نوى البلح فى العليقة لم يظهر أى إختلافات معنوية فى كتلة وإنتاج البيض, الكفاءة الغذائية وحيوية الطيور وأن إستخدام مسحوق نوى البلح بنسبة ٢٠ أو ٣٠% أدى إلى زيادة معنوية فى نسبة الألبيومين بينما أدى إلى إنخفاض معنوى فى نسبة كل من الصفار والقشرة وسمك القشرة ومعامل الصفار. والنتائج المتحصل عليها من التجربة الثانية أوضحت أن هناك انخفاض معنوى فى معدل الزيادة فى وزن الجسم وإستهلاك الغذاء وتحسن معنوى فى الكفاءة الغذائية للطيور التى غذيت على عليقة بها ٢٠ أو ٣٠% مسحوق نوى البلح. إستخدام مسحوق نوى البلح بنسبة ٣٠% أدى إلى زيادة فى نسبة محصول لحم الصدر ووزن القونصة وإنخفاض فى نسبة التصافى والدهن فى الذبائح.

SUMMARY

Two experiments were carried out to investigate the effect of different dietary levels of date seeds meal (DSM) on the performance of local Dandarawi laying hens and growing cockerels. One hundred twenty, 26 week old hens were distributed into four groups in the first experiment (30 birds for each treatment, 3 replicates each) and 240, eight weeks old growing cockerels were also distributed into four equal groups in the second experiment (60 birds for each treatment, 3 replicates each). Four levels of DSM (0, 10, 20, and 30%) were used. Results from the first experiment indicated that replacing 20% of diet with DSM had no significant ($P<0.05$) effect on egg mass, egg production, feed efficiency and survivability. Using DSM at levels of 20 and 30% led to a significant increase in albumen weight and to a significant reduction in yolk, shell percentage, yolk index and shell thickness. Results from the second experiment revealed that there

was a significant (P<0.05) reduction in weight gain and feed intake and a significant improvement in feed efficiency when DSM was included at levels of 20 and 30% of the growing cockerels diet. Replacing 30% of corn with DSM significantly increased in breast percentage and gizzard weight. However, dressing and fat pad percentages were significantly decreased as DSM increased in the diet.

Key words: *Date seed meal, laying hens, growth performance, egg quality, egg production.*

INTRODUCTION

The local limited supply of good quality feedstuffs such as corn and soybean meal for the poultry feed industry has resulted in a continuous increase in the cost of production. Therefore, owing to the shortage and high cost of poultry feedstuffs, especially grains where a large proportion of them are imported, it became necessary to use the agriculture by-products as substitution feedstuffs. Date production in Egypt has been steadily increased over the last 30 years. In 1997, there were about 8 million palm trees producing almost 740 thousand tons date per year (Ministry of Agriculture, 1997). Date seeds, called stones, pits, kernels or pips as parts of the integral date fruit compose about 30% of the date fruit and that represents about 222 thousand tons which are wasted annually. Globally, four million metric tons of palm kernel cakes were produced in the world in 2002 with annual growth of 15% within the last two decades (FAO, 2002). Several research

workers have described the value of date waste as feedstuff and detailed information has been reported by different authors (Jumah, Al- Azzawi and Hashini, 1973; Al-Hiti and Rous, 1978; Kamel *et al.,* 1981; El-Boushy, 1980; Sawaya, *et al.,* 1984; Aduku *et al.,* 1988; Gualtieri and Rapaccini, 1990; Agunbiande *et al.,* 1999; Chin, 2002 and Sundu and Dingle, 2004). The amino acid availability of date seed ranged from 63.3 for glycine to 93.2 in arginine with an average of 84.5% (Nwokolo *et al.,* 1976). The values of crude protein in date seed were ranged from 5.1 to 9.7% (Kholif and abo-El-Nor, 1993 and Perez *et al.,* 2000). McDonald *et al.* (1982) suggested that palm kernel meal (PK) should be limited to 20% in broiler diets. Yeong *et al.* (1981) fed growing chickens various level of PKM in isonitrogenous, isocaloric diets. They found no significant differences in daily feed intake and daily weight gain. Perez *et al.* (2000) found that diet with 50% of PKM caused significant reduction in egg production, however, feed conversion, mortality, and egg weight were not significantly affected by inclusion of PKM in the diets. The objective of the present study was to assess the effect of different levels of date seeds meal (DSM) in dandarawi layer and growing cockerel's diets.

MATERIALS and METHODS

Experiment 1:

This experiment was carried out at the Poultry Farm, Animal and Poultry Production Department, Faculty of Agriculture, Assiut University. This experiment was conducted to evaluate the effect of DSM level on laying hens performance. Date seeds obtained from date manufacturing at New Valley governorate, sun dried for one week, then ground

twice in hummer meal. A total number of 120 twenty six weeks of age Dandarawi laying hens were randomly distributed into four equal groups of thirty hens each (three replicates of 10 hens each). The hens were housed in floor pens covered by wood shaving and exposed to optimum rearing conditions. All hens were received feed and water *ad libitum* and subjected to continuous photoperiod of 16 h light and 8 h dark daily. Four diets with different DSM levels (0, 10, 20 and 30%) were formulated using Feed Formulation System (1995). The experimental diets were formulated to meet the nutrient requirements of laying hens (NRC, 1994). The feeding trial continued for 14 weeks: Two weeks for adapting hens to experimental diets and 12 weeks for data recording. Representative samples of the experimental diets were taken for proximate analyses according to AOAC methods (1990).

Egg production and quality measurements:

Hens were weighed individually at the beginning and the end of the experiment to calculate hen's body weigh gain per treatment. Eggs were collected and recorded daily and egg laying rate was calculated. Mortality was recorded and percent of survived hens per treatment was calculated monthly. Feed consumption per replicate was determined weekly and the average of feed intake (g/hen/day) was calculated monthly. Also, feed efficiency (g egg/g feed) was calculated. Egg quality measurements (egg, albumen, yolk and shell weight, shell thickness and yolk index) were determined on eggs produced at the last 3 days of each month.

Experiment 2:

This experiment was conducted to evaluate the effect of DSM level on growth performance of Dandarawi growing cockerels. A total number of two hundred forty, 8 weeks old

Dandarawi growing cockerels were used in this experiment and randomly distributed into equal four groups of 3 replicates each and housed in floor pens covered by wood shaving and raised under optimum rearing conditions until 20 weeks of age. Four experimental diets were fed with different levels of DSM. All birds received feed and water *ad libitum* and subjected to continuous light (24h).

Growth performance:

Birds were individually weighed weekly; body weight gain was calculated weekly. Feed consumption was estimated on compartment basis during the experimental period. Also, feed efficiency (g gain/g feed) was calculated. Mortality was recorded and percent of survived birds per treatment was calculated monthly.

Carcass measurements:

At 20 weeks of age, 3 surviving birds near to the average live body weight of each replicate was sacrificed to study carcass traits. The assigned birds were deprived of feed for 16 hours, after which birds were individually weighed, slaughtered to complete bleeding, followed by plucking the feathers. The organs and the intestine were removed and weighed. Weight of dressing and giblets were expressed to live body weight of birds. The fat pad surrounding the bursa of fibricius, cloaca and adjacent abdominal muscles was removed. Fat pad weight was determined then calculated as percent of dressed carcass weight. Breast yield was measured by weighing major and minor breast muscles as absolute weight and as percent of dressed carcass.

Statistical Analysis:

Analysis of variance (ANOVA) was performed on the yield data using the general linear model (GLM) of Statistical Analysis System (SAS, 1992). The analysis was carried out according to the following model:

$$Y_{ij} = \mu + T_i + E_{ij}$$

Where Y_{ij} is the observation of the DSM levels, μ is the overall mean, T_i is the effect of DSM level, E_{ij} is the random error.

When a significant effect ($P<0.05$) was proved, differences between treatment means were tested for significance by least squares means (LSM) or Duncan's test as explained by Steel and Torrie (1960).

RESULTS

Table 1: Chemical composition of Date Seed Meal (as-fed basis)

Nutrient	DSM
Dry matter %	92.6
Crude protein %	7.8
Ether extract %	6.7

Crude fiber	19.5
Ash	2.1
NFE	56.5
ME, Kcal/Kg*	2254

*****Analyzed by the University of Georgia Poultry Research Farm, Athens, GA 30602-4356 (Perez *et al.,* 2000)

Table 3: Composition of the diet of experiment 2.

Ingredient	Diet1 (Control)	Diet 2	Diet 3	Diet 4
Ground yellow corn(8.5% CP	66.80	54.03	41.30	28.50
Soybean meal(44% CP)	28.15	28.80	29.50	30.20
Date seed meal (DSM)	00	10.00	20.00	30.00
Mixed oil	1.50	3.62	5.65	7.75
Dicalcium phosphate	1.80	1.80	1.80	1.80
Limestone	1.00	1.00	1.00	1.00
Salt	0.35	0.35	0.35	0.35
Premix	0.20	0.20	0.20	0.20
DL-Methionine(99%)	0.20	0.20	0.20	0.20
Total	100	100	100	100

Calculated analysis				
ME Kcal/Kg	3000	3002	30001	3000
CP%	18.06	18.04	18.05	18.05
Crude fiber	2.70	4.65	6.60	8.55
Ether Extract	3.44	6.82	8.62	10.49
Ca, %	3.27	3.27	3.27	3.27
P, available %	0.50	0.50	0.50	0.50

Each package of 1 kg contain: 2million IU vit. A; 1.5million IU vit. D; 330 mg vit. K; 830 mg vit. E;20000 mg CholineChloride; 830 mg Nicotinc Acid; 35 mg vit. B6; 330 mg vit. B1; 1000 mg vit. B2; 1.75 mg vit. B12; 35 mg Biotin; 85 mg Folic Acid; 335 mg Panyotheinic Acid6670 mg Mg; 500 mg Cu; 35 mg I; 17 mg Se; 12500 mg Fe5000 mg Mn; 11660 mg Zn; 17 mg Cobalt.

Table 4: The effect of date seed meal on Dandarawi laying hens performance

Dietary treatment	Initial body weight (g)	Final body weight (g)	Body weight gain (g)	Feed intake (g/day)	Egg weight (g)	Egg number / 30 day	Egg mass (g/ 30day)	Egg Production /pen (%)	Feed efficiency (g egg/g feed)	Survivability (%)
0% DSM	1317±41	1673±36^{a}	356±19^{b}	117±0.2^{a}	41.86±0.19^{b}	17.35±0.7^{a}	726.3±28^{a}	57.8±1.7^{a}	0.21±0.01^{a}	96.67
10% DSM	1283±38	1622±58^{b}	339±23^{b}	126±0.6^{a}	40.32±0.21^{b}	14.95±0.4^{b}	602.7±17^{b}	49.8±2.4^{b}	0.16±0.01^{b}	93.33
20% DSM	1296±46	1713±57^{a}	417±46^{a}	123±0.4^{a}	42.97±0.36^{a}	16.85±0.6^{a}	724.0±35^{a}	56.2±1.9^{a}	0.19±0.03^{a}	96.97
30% DSM	1284±43	1597±48^{b}	313±39^{b}	104±0.7^{b}	43.13±0.45^{a}	12.67±0.8$^{b\,c}$	546.4±43^{c}	42.2±2.6^{c}	0.17±0.01^{b}	100.0
Significance	NS	*	*	*	*	**	*	*	*	NS

^{ab} means within a column within the same character, with different superscripts are significantly different(P<0.05)

Statistical significant by analysis of variance, NS = not significant

Table 5: The effect of date seed meal on egg quality traits of Dandarawi laying hens performance.

Dietary treatment	Egg weight (g)	Albumen weight (g)	Albumen (%)	Yolk weight (g)	Yolk (%)	Shell Weight (g)	Shell (%)	Shell thickness mm	Yolk Index (%)
0% DSM	41.56±0.23^{b}	20.87±0.21^{a}	49.85±0.82^{b}	14.36±0.15^{a}	34.30±0.19^{a}	5.96±0.08^{a}	14.34±0.45^{a}	0.38±0.01^{a}	48.37±1.13^{a}
10% DSM	40.12±0.31^{b}	19.92±027^{a}	49.40±0.64^{b}	13.07±0.32^{b}	32.58±0.29^{b}	5.74±0.16^{a}	14.31±o.37^{a}	0.35±0.01$^{a\,b}$	47.85±0.96^{a}
20%	43.05±0.22	22.03±0.1	51.26±0.4	14.17±	32.91±0.	5.27±0	12.24±0.	0.32±0.0	44.16±1.3

DSM	7[a]	2[b]	6[a]	0.14 [a]	36[ab]	.11[b]	63[b]	4[b]	3[b]
30% DSM	43.24±0.225[a]	2.96±0.18[b]	3.23±0.97[a]	13.57±0.11 [b]	31.38±0.63[b]	5.26±0.05[b]	12.16±0.72[b]	0.31±0.03[b]	43.37±1.13[b]
Significance	*	*	*	*	*	*	*	*	*

[ab] means within a column within the same character, with different superscripts are significantly different(P<0.05)

Statistical significant by analysis of variance, NS = not significant

Table 6: The effect of date seed meal on growth performance of Dandarawi growing cockerels.

Dietary treatment	Initial body weight (g)	Final body weight (g)	Body weight gain (g)	Daily body weight gain	Total feed consumption (kg)	Daily feed intake (g)	Feed efficiency (g gain/g feed)	Survivability (%)
0% DSM	464.7±35	1876.8±47[a]	1412.1±46[a]	15.69±1.8[a]	6.07±0.31[a]	67.44±2.8[a]	0.23±0.02[a]	97.78
10% DSM	456.5±41	1899.6±37[a]	1443.1±52[a]	16.03±2.0[a]	5.80±0.57[a]	64.44±3.2[a]	0.25±0.01[a]	96.67
20% DSM	462.3±47	1835.0±39[b]	1372.8±37[b]	15.25±3.7[a][b]	4.89±0.26[b]	57.67±1.6[b]	0.28±0.00[b]	100.0
30% DSM	455.7±37	1783.4±25[b]	1327.7±49[b]	14.75±0.9[b]	4.36±0.15[b]	54.11±2.5[b]	0.30±0.01[b]	100.0
Significance	NS	*	*	*	*	*	*	NS

[ab] means within a column within the same character, with different superscripts are significantly different(P<0.05)

Statistical significant by analysis of variance, NS = not significant

Table 7: The effect of date seed meal on carcass measurements of Dandarawi growing cockerels.

Dietary treatment	Body weight (g)	Hot carcass (g)	Dressing (%)	Breast yield (g)	Breast yield (%)	Fat pad weight (g)	Fat pad (%)	Liver weight (g)	Gizzard weight (g)
0% DSM	1894.5± 15.2	1386.77 ±7.5^{a}	73.20± 0.6	312.85± 7.3	22.56±0 .30^{b}	1.8±0.0 1^{a}	0.00 13^{a}	55.6± 1.5	32.4±1 .3^{b}
10% DSM	1904.7± 12.5	1375.62 ±8.2 ^{a}	72.22± 0.4	302.36± 10.2	21.98±0 .29^{b}	0.4±0.0 0^{b}	0.00 03^{b}	52.2± 1.9	34.6±2 .0^{b}
20% DSM	1810.2± 14.6	1317.82 ±6.8^{b}	72.80± 0.2	299.80± 6.9	22.75±0 .26^{ab}	0	0^{b}	50.5± 2.1	45.3±1 .8^{a}
30% DSM	1802.4± 7.2	1308.54 ±6.5^{b}	72.60± 0.0	310.64± 5.3	23.74±0 .45^{a}	0	0^{b}	54.3± 1.4	48.7±2 .9^{a}
Significance	*	*	NS	NS	*	*	*	NS	*

^{ab} means within a column within the same character, with different superscripts are significantly different(P<0.05) Statistical significant by analysis of variance, NS = not significant

DISCUSSION

Experiment 1:

Live body weight, body weight gain, survivability, feed intake and feed efficiency

Data presented in Table (4) proved that DSM level had a significant effect (P<0.05) on body weight. The average body weight of hens received diets contained 10 and 30% DSM was higher especially at DSM level of 30% compared to the hens fed diet contained 0 and 20% DSM. However, body weight gain of birds received diet contained 20% DSM was significantly increased. Compared with the other treatments, feed intake at 30% DSM significantly (P<0.05) decreased. Similar trend was detected for feed efficiency at DSM levels of 10 and 30%. Results in Table (4) show that DSM levels had no significant effect on survivability. Similar results obtained by Yeong *et al.* (1981) who reported that hens tolerated 10 and 20% of palm kernel meal (PKM), but in their study higher levels up to 40% had a negative impact on feed efficiency and survivability. On contrary, Perez *et al.* (2000) found that feed consumption and feed conversion were not significantly affected by inclusion of PKM in the diets at level of 40%.

Egg weight, egg mass and egg production:

The results in Table (4) indicate that the greatest response in egg weight was obtained when the hens were fed diet contained 20 and 30% DSM compared to either 10 or 0% DSM diets. The increase in egg weight at this level of DSM may be explained by high levels of oil in diets that were fed to cover the energy requirements and to compensate reduction in feed intake. Compared with other treatments, 30% DSM significantly decreased egg mass by 25%. While, egg weight of hens received diets contained 30% DSM was increased but egg mass was decreased due to the decrease in egg numbers. The differences in egg production between dietary treatments were significant. The hens fed diet contained 30% DSM had the lowest egg production. The results demonstrate no significant differences existed between the egg productions of hens fed diets contained 20 and 0% DSM. Dietary crude fiber increased markedly with addition of DSM as shown in Table (2), but the diets were calculated to be isocaloric with addition of oil. Due to their high fiber, low palatability and lack of several essential amino acids, coupled with some nutritional problems such as several anti-nutritional properties such as mannan, galactomannan, xylan and arabinoxylan, their inclusion in the poultry diet are very limited (Sundu and Dingle, 2002). However, the changes in physical characteristics of such high-fiber diets might account for observed changes and need further study (Perez *et al.,* 2000). High fiber diets are known to increase the rate of feed passage through the gastrointestinal tract (Connell, 1981) and thus may result in a lowering of the actual ME values of the diets. Also, high dietary fiber can encourage increased sloughing of intestinal epithelial cells, causing an increase in secretion of the mucosa into the intestine, which leads to losses of endogenous amino acids (Parsons *et al.,* 1983). However, the diet with 30% DSM contained 8.53% crude fiber, caused significant reduction in total egg mass, egg numbers and egg production. Similar findings

on egg production criteria were reported by Yeong *et al.* (1981). They reported that hens tolerated 10 and 20% DSM however; higher levels up to 40% had a negative impact on egg number, percentage of egg production, and total egg mass and feed efficiency.

Egg quality traits:

The results of the main effect of DSM on egg quality criteria (Table 5) indicate that there no significant effects (P<0.05) of DSM at the levels of 10% on albumen as absolute weigh or as percentage. Albumen weight and their percentage of eggs from hens were received diets contained 20 and 30% DSM were significantly increased compared with other dietary treatments. Yolk weight and their percentage were not significantly affected by inclusion of DSM at 20% in the diets, but the yolk index was significantly decreased by inclusion of DSM at 20 and 30% in the diet. Shell weight, percentage and thickness were significantly decreased when hens were diets contained 20 and 30% DSM as compared with other levels. The adverse effect on egg quality characteristics at level of 20 and 30% DSM in the diet may be due to anti-nutritional properties which of DSM.

Although, DSM is high-fiber, low energy feedstuff, our results show that it can be used at level of 20% with little effect on egg quality, including yolk weight, yolk index, shell weight, and shell thickness and without effect on performance of hens. Our results, coupled with those of Yoeng *et al.* (1981) and Perez *et al.* (2000). However, continued further works to evaluate its nutritional value are needed. In particular, the low-energy value of DSM needs to be balanced with high-energy fat sources to meet the energy needs of hens, and more information is needed about amino acids availability and fiber differentiation.

Experiment 2:

The effects of DSM levels on growth performance are shown in Table (6), mean of body weight and body weight gain for the treatments were significantly different (P<0.05). Birds fed diet contained 10% DSM had highest weight gain (1443 g) followed by birds fed the control diet (1412 g), while birds fed diet contained 20 and 30% DSM, respectively, had their weight depressed. Daily weight gain of birds fed diet contained 20% DSM was not significantly different from the control group. The reduction of weight gain could be due to the high fiber level of DSM and its gritty nature which were reported to reduce digestibility availability of nutrients especially amino acids (Onwundike, 1986; Yeong, 1983). The nature structural of fiber in DSM may be reduce digestive enzyme action on DSM and availability of the protein (Babatund *et al.,* 1975). There were significant differences (P<0.05) among treatments means for both feed intake and feed efficiency. Birds placed on control diet showed the poorest feed efficiency. Feed intake was depressed in the birds fed diet contained 30% DSM, which may be due to unpalatabilty at 30% DSM (Temperton and Dudley, 1939) and the dietary protein and

energy were drastically reduced. Birds fed diet contained 30% DSM gave the best feed efficiency (0.3). This seems to suggest that replacing 30% of the diet with DSM can provide a better amino acids balance for growing cockerels. The results of growth performance showed that when up to 30% DSM was used in diets for growing cockerels, the feed efficiency and survivability were better than control diet.

Carcass measurements:

Regarding carcass weight data (Table 7), there was a significant reduction for both groups of birds fed 20 and 30% DSM compared to those fed 0 and 10% DSM. No significant differences in the dressing percent and breast yield were detected due to DSM levels. The highest breast percent was obtained in birds received diet contained 30% DSM as compared to 0 and 10% DSM levels.

Fat pad weight and percentage were significantly decreased when DSM level was increased. The reduction of fat pad could be due to the high fiber level of DSM. This result gave an advantage for using DSM in growing local strains. The gizzard weight significantly increased when DSM was increased than 10%. Increasing gizzard weight as increasing DSM levels could be due to the high fiber level of DSM and to its gritty nature.

In general it could be concluded that the addition of DSM to Danadrawi laying hens and growing cockerels diets have no adverse effect on performances. The data obtained in this study showed that dietary DSM can be use to replace 20 and 30% in laying hens and growing cockerel's diets, respectively.

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