Egyptian Poultry Science Journal

http://www.epsaegypt.com

ISSN: 1110-5623 (Print) – 2090-0570 (On line)

EFFECT OF DIFFERENT DIETARY FIBER LEVELS ON REPRODUCTIVE AND ECONOMIC PERFORMANCE OF SINAI LOCAL STRAIN COCKS

A.G. Abdallah; M.M. Beshara, Y.S. Rizk and A.F. Ibrahim
***Anim. Prod. Res. Instit., Agric. Res. Center, Minis. of Agric. Dokki, Giza*.**
Corresponding author: Malak Mansour; E-mail: malakman88@yahoo.com

Received: 28/04/2016 Accepted: 15/05/2016

ABSTRACT: The present study was carried out to investigate the effect of different dietary fiber levels in local Sinai cocks diets on the reproductive and economic performance during the period from 15-40 wks of age. Eighteen Sinai cocks were randomly assigned to different levels of crude fiber. The basal diet contained 3.65% crude fiber and the experimental treatments were given higher levels of crude fiber as a result of usage different levels of sunflower meal, olive cake and combination between them. While, all hens (180 female) were fed layer diet contained 17% crude protein and 2750 Kcal/Kg diet ME. Results of the current study are summarized as follows:

1. The cocks fed diet contained 5.9 and 4.65% CF (14 and 7% SFM) recoded the lowest live body weight, and also resulted in a significantly decrease ($p \leq 0.05$) in body weight gain compared to the control diet**.**
2. The mass motility of sperms was significantly increased ($p \leq 0.05$) by about 16.28% of males fed diet contained 6.02 % CF (7% SFM+5%OK) comparing with control diet.
3. Both progressive motility and sperm concentration were improved by increasing dietary CF from 3.65% (control) to 6.02 % (7% SFM+5%OK).
4. The fertility% was significantly improved ($p \leq 0.05$) in eggs from hens that were inseminated by cocks fed diet contained 5.9% CF (14% SFM) by about 7.89 % compared to the control diet.
5. The hatchability of set eggs % was significantly increased ($p \leq 0.05$) by feeding diet contained 5.9 5% CF (14% SFM) comparing with the control diet followed by those fed diet with 5.45% CF and 4.77% CF (7% SFM and 5% OK).
6. The diets contained 4.77 and 6.02% CF (5% OK and 7% SFM +5 % OK) resulted in a significant increase ($p \leq 0.05$) the hatchability of fertile eggs % by about 3.38% as compared to the control group**.**
7. The diet contained 5.95 CF (14% SFM) resulted in significantly improved ($p \leq 0.05$) economic efficiency of hatchability of set eggs compared with the control diet**.**

The present study illustrates that local Sinai cocks require a moderate levels of crude fiber in diets ranged from 4.65 to 5.95 % from (5 % Ok, 7% and 14% SFM) during the period from 15 to 40 weeks of age for optimal the reproductive and economical performance.

Key Words: Dietary fiber- Sunflower meal-Olive cake- Cocks- Semen Quality,

INTRODUCTION

In fact, in any system of poultry production, the communion of feed is nearly 70% of total production cost. According to some scientific publications **(Hetland et al., 2005; Hetland and Svihus, 2007; Incharoen and Maneechote, 2013)**, the chicken pullets, laying hens and broilers can tolerate a moderate amounts of crude fiber in their diets, which can lower the cost of feeding, where the feed cost comprises the major part of running cost. In Egypt the annual production of plant by–products is about 24 million tons (**El-Manyalawi et al., 2005**). **Varastegani and Dahlan,(2014)** mentioned that utilization of fiber from these byproducts in the poultry diet as a supplement plays an important role in poultry health and production.

The fiber (non-starch polysaccharides) can be classified into two groups based on solubility in water: insoluble and soluble fiber **(Choct and Kocher 2000)**. These components are resistant to digestion by endogenous enzymes but, microbial degradation in the ceca and acid digestion in the proventriculus can to some extent be effective in this regard **(Leeson and summers, 2001)**. **Edwards (1995)** reported that soluble fiber increase viscosity and usually have anti-nutrive properties. However, insoluble fiber has shown beneficial effects on nutrient digestion **(Hetland and Svihus 2001)**, increases HCl, bile acids, improves digestive organ development and improves enzymes secretion **(Jiménez-Moreno et al., 2010; Svihus, 2011)**. Therefore, inclusion of a fiber source in the diet might result in improvements in nutrient digestibility, growth performance, gastrointestinal tract (GIT) health, and eventually, improves poultry welfare **(Kalmendal et al., 2011)**. The beneficial effects of insoluble fiber in the diet depend on the ratio of insoluble to soluble fibers to provide optimal efficiency **(Burhalter et al., 2001)** In this respect, the study by **(Jimenes-Moreno et al., 2010)** illustrated that the recycling of bile acids and the absorption of fat will be more complete in chicks fed cellulose (insoluble fiber) than in chicks fed more soluble fiber sources. Also, the effects of insoluble fiber inclusion depends on feed form, the health status of the chickens such as digestive disturbances, the management and nutritional processes which including access of the chickens to litter materials (floor pens or battery cages) and composition of the basal diet **(Mateos et al., 2012).**

Indeed, diets for poultry cocks, may contain soybean meal in excess of 20%, and as a result, these diets contain large amounts of α-galactosides **(Baker, 2000)**. High concentrations of these oligosaccharides in the diet have been reported to cause a decrease in intestinal absorptive surface area and in calcium retention, as well as an undesirable increase in litter moisture content in poultry **(Juśkiewicz et al., 2009)**. The high cost of soybean meal prompted interest in other high-protein feed ingredients with a reduced α-galactoside content, including sunflower meal (SFM). However, incorporation of sunflower meal is limited in poultry diets where there are variations in its chemical composition, and it is high fiber/ low lysine contents and low energy **(Senkoylu and Dale, 1999)**. However Sunflower meal is a well-established and relatively inexpensive protein source for poultry diets and in contrast to soybean meal, SFM contains lower quantities of anti- nutritional compounds **(Canibe et al., 1999)**. **Michael and Sunde (1985)**, found that soybean meal can be completely replaced by sunflower seeds in 12-20 week-old layers fed diets, without any adverse effect on the productive performance. The results in study by **Jankowski et al., (2011)** showed that

poultry diets can be effectively supplemented with high- quality SFM at a concentration of approximately 70 g/kg.

Olive cake (OK) is nearly 30% from the olive seeds and it is by – product of the olive oil mill extraction process and the industry of olive reserve. The olive by-products can be used as a fertilizer, however as an animal feed there are some studies about its efficiency in broiler nutrition **(Rabayaa et al., 2001; Omar, 2003)** and laying hens **(Taklimi et al., 1999)**. There are 118,697 cultivated feddans of olive in Egypt **(M.A.L.R. 2004)**. Olive cake is seldom incorporation into poultry diets because it tend to have low levels of lysine, methionine and hisidine **(Afsari et al., (2014)** but they also found that OP can be included in laying hens diets up to 16% with no adverse effect on performance, also OK tend to have high in crude fiber (lignin). However, Ok is considered as a good source of fat (18% crude fat), for its level of residual oil, this can constitute a complementary energy source. **Abdallah et al., (2015)** found that the inclusion of a fiber source such as SFM and OK in Sinai pullets from 11-19 wks of age results in beneficial effects on the development of the different organs of the GIT, nutrient digestibility, and productive performance.

Therefore, the current study was conducted to investigate the productive and reproductive performance resulting from using the different levels and sources of crude fiber (CF) in local Sinai cocks diets comparing with the diet with 3.65% crude fiber during the period from 15-40 wks of age.

MATERIALS AND METHODS

Bird's management:

This study was conducted at El-Serw Poultry Research Station, Animal Poultry Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. Eighteen Sinai cocks were randomly assigned to six dietary treatments in an experiment that was conducted from 15 to 40 wks of age. At the onset of the experiment, birds were weighed and assigned to treatments based on body weight so that mean body weight were similar for birds on all treatments and the birds were kept on cages with one bird /cage (60 cm long x 50cm wide x 60cm high) Also, one hundred and eighty local Sinai laying hens at 27 weeks old of age were randomly assigned to layer diet contained 17% crude protein and 2750 Kcal/Kg diet ME to evaluate the effect of cocks dietary treatments on productive and economic performance till 40 weeks of age. A daily photoperiod was 16 hr during the laying period.

Growing and layer diets:

Samples of SFM and olive cake (part of pulp, seeds and embryo which include 30%of olive seeds) were taken to determine approximate analysis according to **AOAC (1990)** method. Acid detergent fiber and neutral detergent fiber were determined by **Van Soest et al. (1991)**. Nitrogen free extract (NFE) was calculated by subtracting the sum of protein, ether extract, NDF from organic mater (OM). The hemicelluloses content was calculated as a difference between ADF and ADF. The metabolizable energy (ME) of SFM and OK was calculated based on chemical composition according to equation NRC (1994) where:

ME= 36.63 x CP +77.96 x EE +19.87 x NFE.

The approximate analysis of SFM and OK used in this study is presented in Table (1). The ingredients and the nutrient composition of the experimental diets are presented in Table (2). In the cock's diets, six experimental diets were formulated to nearly meet the **NRC (1994)** recommendations and all diets were isocaloric and isonitrogenous but it contained increased levels of the fibers. The control cocks were fed a control diet with corn, soybean and wheat bran as the main ingredients, and the other treatments were given diets contained a moderate levels of fibers as a result of usage different levels of SFM (7 and 14 %), OK (5 and 10%) and combination between them (7% SFM and 5% OK). While, in the hen's diet, it was isocaloric and isonitrogenous where, it contained 17% crude protein and 2750 Kcal/Kg diet ME.

Productive and Reproductive traits:

1. Body weight (BW) was recorded at the beginning and at the end of the experiment and also the feed intake were recorded daily.
2. Semen quality traits were measured where; three cocks were used from each treatment by a positive reaction to dorso-abdominal massage for artificial collection of semen. Semen was collected during the experimental period, and then ejaculate volume, sperms motility and concentration were determined for each cock.
3. In addition, natural insemination was used in this study, where at 38 wks of age the males were transported to the hens then eggs from each replicate were collected for 5 days. The eggs were set in incubator. Fertility and hatchability were calculated and hatched chicks were weighed.

Economical efficiency:

Economical efficiency for hatchability was expressed as hen-production and calculated using the following equation:

Economic efficiency (%) = (Net return LE/Total feed cost LE) × 100.

Statistical analysis:

Data were statistically analyzed using General Linear Models Procedure of the **SPSS (2008)**, differences between treatments were subjected to Duncan´ s Multiple Range – test **(Duncan, 1955)**.

The following model was used to study the effect of treatments on the parameters investigated as follows: $Yij = \mu + Ti + eij$ where:

Yij = an observation, μ = overall mean, Ti = effect of treatment (i=1, 2, 3, 4, 5, 6) and eij = Random error.

Results and discussion:

Chemical analysis of SFM and OK:

Results of the proximal analysis of SFM and OK are presented in Table (1). The results illustrated that crude protein was 32.65 and 6.165 in SEM and OK while ether extract was 18.92 and 1.26% in OK and SFM. In addition, the record of CF and lignin was higher in OK than SFM by about 32.12 and 36.67% respectively. **Amici et al. (1991)** reported that the CF is mainly constituted by lignin which limits the feed value of OK.

Growth performance:

Results given in Table (3) represent body weight (BW), body weight gain (BWG) and feed consumption/male/day (g) in response to feeding the different levels of dietary crude fiber (CF) during the period from 15 to 50 weeks of age for local Sinai cocks. In comparison with the control diet (3.65% CF), it was clearly found that the mean values of the BW at 40 week of age and BWG had fixed trend where, the cocks fed diet contained 5.9 and 4.65% CF (14 and 7% SFM) recoded the lowest BW by about 10.2%, also in respect of BWG the same treatments resulted in a significantly decrease ($p \leq 0.05$) in BWG by

24.1 and 22.4% respectively as compared to the control diet. On the other hand, the results showed that the other treatments had no significant effect (P≥0.05) on BW and BWG compared to control diet. In addition, all the different levels of dietary CF resulted in insignificantly decrease in feed consumption / cock /day comparing with the control group.

It is evident that the experiments were carried out on Sinai cocks (15 - 40 wks old) that had already reached the average of mature live body weight of this strain in nearly 24 weeks of age. Physiologically any increase above this average record indicates that cocks tended toward obesity and reflects the incidence of abdominal and visceral fat deposition, a matter which is considered a disadvantage especially with cocks will be used to inseminate the breeder hens. This suggestion is supported by the results on feed consumption where as aforementioned birds fed diets with different level of CF consumed less amounts of feed. This means that their lower body weight utilized less food for maintenance.

Hetland et al. (2005); Hetland and Svihus, (2007) found that there are beneficial effects of fiber incorporation in the pullet and layer diets. Decreasing feed intake in diet contained high level of fiber perhaps due to decreasing its density comparing with the control diet and consequently feed intake decreased resulted from the physical limitation (**Ali et al., 2005**). The level and type of fiber are the main factors in regulating the feed intake and mean retention time in the cecum (**De Blas et al., 1999**). **Hetland and Svihus (2001)** reported that birds were able to maintain adequate BWG when fed diets containing high levels of insoluble fiber, probably because fiber increases the rate of passage of the digesta through the digestive system as well as the physical capacity of the gastrointestinal tract. Indeed, dietary crude fiber might accumulate in the gizzard and slow feed passage rate, at least in the proximal part of the gastrointestinal tract (**Svihus, 2011**). In addition, the presence of coarse fiber particles might also decrease the passage time of fine particles of the diet (**Hetland and Svihus, 2001; Svihus et al., 2002**). The level and type of fiber are the main factors in regulating the feed intake and mean retention time in the cecum **(De Blas et al., 1999)**.

Semen quality:

Results on semen quality (Table 4) showed significant differences (p≤0.05) as a result of feeding different levels of CF in the dietary cocks for all studied semen quality traits with exception of the semen volume (ml) which was insignificantly affected (P≥0.05). In respect of the mass motility, it was significantly increased by about 16.28% of males fed diet contained 6.02 % CF (7% SFM+5%OK) comparing with control diet. Moreover, both progressive motility and sperm concentration were improved by increasing dietary CF from 3.65% (control) to 6.02 % (7% SFM+5%OK).

It is remarkable that when the low levels of SFM and OK were added together (7% SFM+5% OK) the semen quality improved compared to control, and it was significantly higher (p≤0.05) than SFM and OK alone suggesting a synergistic effect. The possible reason for this effect is due to the ratio between the insoluble and soluble fiber in the diet, where this ratio appears to be important in the diets formation to

provide optimal efficiency (**Burhalter et al., 2001**). Moreover, the effect of dietary fiber may be due to feed form and the health status of the chickens such as digestive disturbances **(Mateos et al., 2012)**, also depending on the amount and source of dietary fiber, as well as on the composition of the basal diet, the profile of the existing microbiota in the distal part of the gastrointestinal tract might be affected (**Amerah et al., 2009** and **Shakouri et al., 2006**).

Also, this improvement may be attributed to the effect of olive oil in OK where OK contains 18.92 % fat (Table 1). Olive oil is a good source of photochemical including polyphenolic compounds and α-tocopherol (**Stark and Mader 2002**). In addition, **Mailer (2006)** reported that olive oil contains Tocopherols, fatty alcohols, waxes and hydrocarbons, such as squalene pigments (chlorophyll and carotenoids) and β -carotene which acts as an antioxidant during storage. **Servili et al. (2014)** illustrated that the nutritional value of olive oil is due to the high monounsaturated fatty acid content, principally made of oleic acid. Hydrophilic and lipophilic phenols represented the main antioxidants of olive oil and they include a large variety of compounds. In fact, peroxidative damage to spermatozoa is believed to be a major cause of male subfertility (**Hammerstedt, 1993 ; Aitken , 1994**) . Thus, enhancement of the antioxidant capacity of semen by supplementation of natural antioxidants such as **olive oil** could present a major opportunity for improving male fertility. In accordance with **Surai et al., (1997)**, who postulated that the beneficial consequences of an effective protection against lipid peroxidation of birds semen are likely to result from two related mechanisms: (a) Defense against per oxidative damage is essential to maintain the structural integrity of the spermatozoa; (b) Minimization of lipid peroxidation will prevent any reduction in the concentrations of the functionally important n-6 polyunsaturated fatty acids of the semen phospholipids.

Fertility and hatchability:

The effects of feeding diets with different levels of CF on incubated eggs are presented in Table (5). Results clearly observed that fertility% was significantly improved ($P \leq 0.05$) in eggs from hens were inseminated by cocks fed diet contained 5.9% CF (14% SFM) by about 7.89 % compared to the control diet. On the other hand, no significant ($P \geq 0.05$) differences were detected among the other treatments and control diet. In addition, significant influence was found on hatchability of set eggs % by feeding on diet contained 5.9 5% CF (14% SFM) comparing with the control diet followed by those fed diet with 5.45% CF and 4.77% CF (7 %SFM and 4% OK). Also, the experimental diets contained 4.77 and 6.02% CF (4% OK and 7% SFM +4% OK) resulted in a significant increase the hatchability of fertile eggs % by about 3.38% as compared to the control diet compared to the control diet while, the diet contained 6.23% CF (8% OK) resulted in a significant decrease ($P \leq 0.05$) the hatchability of fertile eggs % compared with the control and the other experimental diets. On the other hand, no significant effect on the chick weight at hatch due to feeding the different levels of dietary crude fiber.

Concerning the present study, it is interesting to notice that the inclusion of moderate amounts of crude fiber in Sinai cocks diets resulted in improve reproductive traits, it could be mentioned that this improvement may be du to many mechanisms. According to **Michael and Sunde (1985)**, SFM is relatively rich in sulfur amino acids. Unlike most other oilseed meals, SFM does not contain high concentrations of anti-nutritive factors (**Casartelli et al., 2006**). **Michel and Sunde (1985)** found that the productive performance was standard in layers fed diets from 12-20 weeks of age when

soybean meal was completely replaced by sunflower seed.

In respect of OK, it is considered as a good source of fat (18% crude fat), for its level of residual oil and this can constitute a complementary energy source. On the other hand, for its particular composition of unsaturated fatty acids (62.4% of oleic acid, 18.2% of linoleic acid, 1.1% of linolenic acid and 2.7% of palmitoleic acid) (**El-Hachemi et al., 2007**) which could influence the accumulation of fatty acid in the various body compartments during the animal's life. In addition, scientific publications stated that an appropriate level of insoluble fiber added to poultry diets can improves digestive organ development (**González-Alvarado et al., 2007** and **Hetland and Svihus, 2007**) and increases HCl, bile acids, and enzyme secretion (**Svihus, 2011** and **Hetland et al., 2003**). These changes might result in improvements in nutrient digestibility **(Amerah et al., 2009** and **Rogel et al., 1987)**, growth performance (**González-Alvarado, 2010** and **Sklan et al., 2003**), gastrointestinal tract health (**Correa-Matos et al., 2003** and **Perez et al., 2011**), and eventually, poultry performance **(Aerni et al., 2000** and **Van Krimpen et al., 2009**).

Economic efficiency:

Results concerning the economic efficiency of hatchability of set eggs % as influenced by dietary different levels of CF to local Sinai cocks are shown in Table (6). The results illustrated that the diet contained 5.9 5 CF (14% SFM) resulted in significantly improved ($p \leq 0.05$) economic efficiency of commercial hatchability comparing with the control diet by about 13.89% followed by the experimental diets contained 4.77 and 4.65 % CF (4% OK and 7% SFM) respectively where, the economic efficiency was significantly higher ($p \leq 0.05$) due to the diets with4.77 and 4.65 % CF (4% OK and 7% SFM) than control diet.

The present results confirm importance including a moderate amount of CF in Sinai cock's diets up to 6 % from 15 to 40 weeks of age for optimal development, reproductive and economic performance.

Table (1): Chemical composition and metabolizable energy (ME) content of high fiber Sunflower meal (SFM) and Olive cake (OK) in Egypt

Nutrients (%)	As fed basis	
	SFM	**OK**
Moisture	8.43	6.16
Dry Mater	91.57	93.84
Crude Protein	32.65	6.79
Crude Fat	1.26	18.92
Crude Fiber	25.22	33.32
Neutral detergent fiber (NDF)	35.23	57.00
Acid detergent fiber (ADF)	29.8	41.65
Cellulose	21.05	27.85
Hemicellulose	5.43	15.35
Lignin	8.74	13.80
Ash	6.09	10.92
ME (kcal/kg) *	1619	1728

* Metabolizable energy (ME, kcal/kg) was calculated according to NRC (1994). ME = 36.63 × CP + 77.97 × EE +19.87 × NFE.

Table (**2):** Composition and analysis of the experiment diets fed to local Sinai males throughout the period from15-40 weeks of age.

Ingredients (%) \ Diets	Dietary fiber level, %					
	3.65	**4.65**	**5.90**	**4.77**	**6.23**	**6.02**
	1 (control)	**2**	**3**	**4**	**5**	**6**
Yellow corn	71.50	73.00	71.50	71.00	66.00	69.50
Soy bean meal (44 %)	18.50	13.00	7.00	19.70	18.50	12.00
Corn gluten (60 %)	0.00	1.00	2.00	0.00	1.00	2.00
Wheat bran	6.00	2.00	1.50	0.30	0.50	0.50
Olive cake (6.79 %)	0.00	0.00	0.00	**5.00**	**10.00**	**5.00**
Sunflower meal (32.65 %)	0.00	**7.00**	**14.00**	0.00	0.00	**7.00**
Di-calcium phosphate	1.35	1.35	1.35	1.35	1.35	1.35
Limestone	2.00	2.00	2.00	2.00	2.00	2.00
Vit & Min. premix [1]	0.30	0.30	0.30	0.30	0.30	0.30
NaCl	0.30	0.30	0.30	0.30	0.30	0.30
DL- Methionine (99%)	0.05	0.05	0.05	0.05	0.05	0.05
Total	**100**	**100**	**100**	**100**	**100**	**100**
Calculated Analysis [2]						
Crude protein %	14.57	14.57	14.65	14.55	14.62	14.60
ME (Kcal / kg)	2888	2913	2873	2909	2842	2878
Crude fiber %	**3.65**	**4.65**	**5.90**	**4.77**	**6.23**	**6.02**
Ether extract %	3.00	3.16	3.10	3.95	4.72	3.92
Calcium (%)	1.14	1.12	1.102	1.14	1.13	1.11
Av. Phosphorus (%)	0.385	0.359	0.34	0.368	0.36	0.348
Methionine %	0.33	0.301	0.274	0.319	0.319	0.301
Methio + cyst %	0.583	0.518	0.557	0.561	0.558	0.511
Price (LE/kg) [3]	**2.832**	**2.757**	**2.667**	**2.795**	**2.731**	**2.699**

1- Each 3kg of Vit .and Min. premix contains 100 million IUVit A;2 million IU Vit.D3;10 g Vit.E; 1 g Vit.K3 ; 1 g Vit B1; 5 g Vit B2 ;10 mg Vit.B12 ; 1.5 g Vit B6; 30 g Niacin ;10 g Pantothenic acid ;1g Folic acid;50 mg Biotin ; 300 g Choline chloride; 50 g Zinc; 4 g Copper; 0.3 g Iodine ; 30 g Iron; 0.1 g Selenium; 60g Manganese ;0.1 g Cobalt; and carrier CaCO3 to 3000 g .

2- According to Feed Composition Tables for animal and poultry feedstuffs used in Egypt (2001).

3- Price of one kg (LE) at time of experiment for different ingredients : yellow corn, 2.27; Soy been meal, 5.05; Corn gluten, 6.50; Wheat bran, 2.22; Olive cake, 0.80; Sunflower meal, 2.75; Di-calcium, 4.55; limestone, 1.50; Vit. & Min., 20.0; Na cl, 0.50 and Meth, 32.0

Table (3): Effect of feeding different levels of dietary crude fiber on growth performance of local Sinai males from 15 to 40 week of age

Age (wks)	Dietary fiber level, %						Pooled SEM	Sig.
	3.65[1]	4.65[2]	5.9[3]	4.77[4]	6.23[5]	6.02[6]		
Body weight (BW) (g/ hen)								
Initial(15 wks)	1150.0	1166.67	1150.0	1150.0	1183.3	1133.3	13.34	NS
Final (40wks)	2116.7^{a}	1900.0^{b}	1900.0^{b}	2033.3^{ab}	2016.7^{ab}	1983.3^{ab}	26.58	0.05
BWG	966.7a	733.3^{b}	750.0^{b}	883.3^{ab}	833.3^{ab}	850.0^{ab}	836.1	0.05
Feed intake/cock/day	90.4	88.5	85.7	87.0	85.5	89.4	0.45	NS

[1]the control level is 3.2% fiber to the basal diet; 2,4fed the basal diets with high fiber level (containing either SFM 7% or OK 5% of the total ingredients in the diet, respectively); 3,5,6 fed the basal diets with very high fiber level (containing either SFM 14 % or OK 10% or OK 5% + SFM 7% combination of the total ingredients in the diet, respectively).
a,b,c :means in the same row bearing different superscripts are significantly different ($p \leq 0.05$).
NS= non-significant

Table (4): The effect of feeding different levels of dietary crude fiber during growing and laying period on semen quality traits of local Sinai hens

Parameters, %	Dietary fiber level, %						Pooled SEM	Sig.
	3.65	4.65	5.9	4.77	6.23	6.02		
Volume ml	0.1	0.18	0.1	0.18	0.37	0.3	0.04	NS
Mass motility	4.3^{b}	4.0^{b}	4.0^{b}	3.7^{b}	4.0^{b}	5.0^{a}	0.12	0.05
Progressive motility %	83.3^{ab}	80.0^{ab}	78.3^{ab}	73.3^{b}	81.7^{ab}	90.0^{a}	1.91	0.05
Concentration*10^{9}	1.59^{bc}	1.33^{bc}	1.27^{c}	1.17.0^{c}	2.11^{b}	3.18^{a}	17.86	0.05

a,b,c,..: means in the same row bearing different superscripts are significantly different ($p \leq 0.05$).
NS= non-significant

Table (5): The effect of feeding different levels of dietary crude fiber during laying period on hatchability traits of local Sinai hens

Parameters, %	Dietary fiber level, %						Pooled SEM	Sig.
	3.65	4.65	5.9	4.77	6.23	6.02		
Fertility, %	90.0^{b}	92.86^{b}	97.14^{a}	91.43^{b}	92.86^{b}	90.0^{b}	0.67	0.05
Hatchability of set eggs, %	85.71^{b}	90.0^{ab}	92.86^{a}	90.0^{ab}	85.71^{b}	88.57^{bc}	0.71	0.05
Hatchability of fertile eggs, %	95.22^{b}	96.94^{ab}	95.59^{b}	98.44^{a}	92.32^{c}	98.41^{a}	0.01	0.05
Chick wt. (g) at hatch	34.7	35.2	35.5	35.1	34.9	35.7	0.22	NS

a,b,c : means in the same row bearing different superscripts are significantly different ($p \leq 0.05$).
NS= non-significant

Table (6): The effect of feeding different levels of dietary crude fiber on economic efficiency of local Sinai males from 15 - 40 weeks of age

Items Treatments		Price of kg feed/male (LE)[1]	Price of kg feed/female (LE)	Hatchability of set eggs, %	Price of one chick (LE)	Total return (LE)	Net return (LE)	EEF (%) [2]	REE[3]
Dietary fiber level, %	3.65	2.832	283.42	85.71	1.0	19.71	16.95	6.12^{c}	100^{b}
	4.65	2.757	283.42	90.0	1.0	20.7	17.97	6.59^{b}	106^{ab}
	5.90	2.667	283.42	92.86	1.0	21.36	18.68	6.97^{a}	114^{a}
	4.77	2.795	283.42	90.0	1.0	20.7	17.98	6.60^{b}	108.1^{ab}
	4.77	2.731	283.42	85.0	1.0	19.71	17.03	6.35^{bc}	103.7^{b}
	6.02	2.699	283.42	88.57	1.0	20.37	17.64	6.47^{bc}	105.7^{ab}
	Pooled SEM							0.08	1.38
	Sig.							0.05	0.05

[1] LE= Egyptian pound. 7 According to price at the experimental time.
[2] EEF (%) = economic efficiency (%) = (Net return LE /Total feed cost LE) × 100. [3]Relative EE= Assuming EEF of the control equals 100%
A,b,c,.. : means in the same column bearing different superscripts are significantly different ($p \leq 0.05$)

REFFERANCES

Abdallah, A.G.; M.M. Beshara and A.F. Ibrahim (2015). Effect of different levels and sources of dietary fiber on productive and economical performance in local laying hens 1- During growing period and subsequent laying performance. Egypt. Poult. Sci., (35) (I): (367-398)

Aerni, V.; H. El-Lethey and B. Wechsler (2000). Effect of foraging material and food form on feather pecking in laying hens. Br. Poult. Sci. 41:16–21.

Afsari M.. M. Ahmad and T. Mehran (2014). Effects of dietary inclusion of olive pulp supplemented with probiotics on productive performance, egg quality and blood parameters of laying hens.Annual Research and Review in Biology 4(1): 198-211.

Aitken R.J. (1994). A free radical theory of male infertility. Reproduction, Fertility and Development **6:** 19-24

Ali, M.N.; M.S. Hassan and I.M. Abaza (2005). Effect of the utilization of wheat bran on productive and physiological performance for local laying hens. Egyptian Poultry Science 26(1): 137-158.

Amerah, A. M.; V. Ravindran and R. G. Lentle (2009). Influence of insoluble fibre and whole wheat inclusion on the performance, digestive tract development and ileal microbiota profile of broiler chickens. Br. Poult. Sci. 50:366–375.

Amici, A.; M. Verna and F. Martillotti (1991). Olive byproducts in animal feeding: improvement and utilization. Options Méditerranéennes – Series Seminaries, 16: 149-152.

Association of Official Analytical Chemists (AOAC) (1990). Official methods of analysis. 13th Ed. Published by the AOAC., Washington, D.C., USA.

Baker, D.H. (2000). Nutritional constraints to the use of soy products by animals, in: DRACKLY, J.K. (Ed) *Soy in animal nutrition*, pp: 1-12 (Federation of Animal Science Societies, Savoy, Illinois, USA).

Burhalter, T.M.; N.R. Merchen; L.L. Bauer; S.M. Murray; A.R. Patil; J.L. Brent and G.C. Fahey (2001). The ratio of insoluble to soluble fiber components in soybean hulls affect ileal and total-tract nutrient digestibilities and fecal characteristics of dogs. J. Nutr., 131: 1978–1985.

Canibe, N.; M.M. Pedrosa; L.M. Robredo and K.E.B. Knudsen (1999). Chemical composition, digestibility and protein quality of 12 sunflower (Helianthus Annuus L) cultivars. Journal of the Science of Food and Agriculture, 79: 1775-1782.

Casartelli E.M; R.S. Filardi; O.M. Junqueira; A.C. Laurentiz; V. Assuena and K.F. Duarte (2006). Commercial Laying hens diets formulated according to different recommendations of total and digestible amino acids. Brazilian Journal of Poultry Science 7(3):177-180.

Choct, M. and Kocher A. (2000). Non starch carbohydrates: digestion and secondary effects in monogastrics.24th Annual Meeting of The Nutrition Society of Australia.

Correa-Matos, N. J.; S. M. Donovan; R. E. Issacson; H. R. Gaskins; B. A. White and K. A. Tappenden (2003). Fermentable fiber reduces recovery time and improves intestinal function in piglets following Salmonella typhimurium infection. J. Nutr. 133:1845–1852.

De Blas, J. C.; J. Garcia and R. Carabano (1999). Role of fiber in rabbit diets: A review. Ann. Zootech. (Paris) 48: 3-13.

Duncan, D.B. (1955). Multiple ranges and multiple f-test, Biometries 11: 1-42.

Edwards, C.A. (1995). The physiological effects of dietary fiber. In dietary fiber in health and disease. D. Krit - chevskv and C. Bonfield, edition. Eagan Press, St. Paul, MN. Pp: 58-71.

El-Hachemi, A.; K.E. El-Mecherfi; K. Benzineb and D. Saidi, (2007). Supplementation of olive mill wastes in broiler chicken feeding. Afr. J. Biotechnol., 6: 1848-1853.

El-Manyalawi, M.A.; Ibrahim, M.R.A.; Ahmed, Fatma, G. and Salama, Walaa, A. (2005). Performance of growing rabbits fed diets containing geranium and pearmint by-products . Egypt. J. Rabbit Sci., 15: 13-26.

González-Alvarado, J. M.; E. Jiménez-Moreno; R. Lázaro and G. G. Mateos (2007). Effects of type of cereal, heat processing of the cereal, and inclusion of fiber in thediet on productive performance and digestive traits of broilers. Poult. Sci. 86:1705–1715.

Gonzalez-Alvarado, J.M.; E. Jimenez-Moreno; D. Gonzalez-Sanchez; R. Lazaro and G.G. Mateos (2010). Effect of inclusion of oat hulls and sugar beet pulp in the diet on productive performance and digestive traits of broilers from 1 to 42 days of age. Animal Feed Science and Technology 162:37-46.

Hammerstedt, R.H. (1993). Maintenance of bioenergetic balance in sperm and preventation of lipid peroxidation: a review of the effect on design of storage preservation systems. Reproduction, Fertility and Development **5:** 675-690.

Hetland, H. and B. Svihus (2001). Effect of oat hulls on performance, gut capacity and feed passage time in broiler chickens. Br. Poult. Sci. 42:354–361.

Hetland, H.; B. Svihus and M. Choct (2005). Role of insoluble fiber on gizzard activity in layers. Worlds Poultry Science J., 60: 415-422.

Hetland, H.; B. Svihus and A. Krogdahl (2003). Effects of oat hulls and wood shavings on digestion in broilers and layers fed diets based on whole or ground wheat. Br. Poult. Sci., 44: 275-282.

Hetland, H. and B. Svihus (2007). Inclusion of dust bathing materials affects nutrient digestion and gut physiology of layers. J. Appl. Poult. Res. 16:22–26.

Incharoen, T. and P. Maneechote (2013). The effects of dietary whole rice hull as insoluble fiber on the flock uniformity of pullets and the egg performance and intestinal mucosa of laying hens. American Journal of Agricultural and Biological Sciences 8 (4): 323-329.

Jankowski,J.; A. Lecewicz; Z. Zdunczyk; J. Juskiewicz AND B.A. Slominski.(2011). The effect of partial replacement of soyabean meal with sunflower meal on ileal adaptation, nutrient utilisation and growth performance of young turkeys. British Poultry Sci. pp 1-25.

Jiménez-Moreno, E.; J.M. Gonzalez-Alvarado; D. Gonzalez-Sanchez; R. Lazaro and G.G. Mateos (2010). Effects of type and particle sizeof dietary fiber on growth performance and digestive traits of broilers from 1

to 21 days of age. Poultry Sci. 89: 2197-2212.

Jiménez-Moreno, E.; C. Romero; J. D. Berrocoso; M. Frikha and G. G. Mateos (2011). Effects of the inclusion of oat hulls or sugar beet pulp in the diet on gizzard characteristics, apparent ileal digestibility of nutrients, and microbial count in the ceca in 36-day-old broilers reared on floor. Poult. Sci. 90(Suppl. 1):153. (Abstr.)

Juskiewicz, J., Jankowski, J., Zdunczyk, Z., Lecewicz, A., Przybylska-gornowicz, B. and Zieba, M. (2009). Effect of diets with different contents of soybean α-galactosides and crude fiber on modification of duodenal microstructure and selected parameters of nutrient utilization in young turkeys. Polish Journal of Veterinary Sciences, **12**: 455-463.

Kalmendal, R.; K. Elwinger; L. Holm and R. Tauson (2011). High-fiber sunflower cake affects small intestinal digestion and health in broiler chickens. British Poultry Science 52:86-96.

Perez, V. G.; C. M. Jacobs; J. Barnes; M. C. Jenkins; M. S. Kuhlenschmidt; G. C. Fahey; C. M. Parsons and J. E. Pettigrew (2011). Effect of corn distillers dried grains with solubles and Eimeria acervulina infection on growth performance and the intestinal microbiota of young chicks. Poult. Sci. 90:958–964.

Leeson, S. and J.D. Summers (2001). Digestion and nutrient availability. Page 5 in Scott's Nutrition of the Chicken. Univ. Books, Guelph, Ontario, Canada.

Mateos, G.G.; Jimenex-Moreno, E.; Serrano, M.P. and Lazaro, R.P.(2012). Poultry response to high levels of dietary fiber sources varing in physical and chemical characteristics. J. Appl. Pout. Res. 21:156-174.

Mailer, R. (2006). Chemistry and quality of olive oil. NSW Deparment of Primary Indutries .WWW. dpi.nsw.gov.au.

M.A.L.R., Minister of Agriculture and Land Reclamation (2004). Economic Affaris Sector. Agriculture statistics. V. 2 (June) P. 269-328.

Michael J.N. and Sunde M.L. (1985). Sunflower meals in pullet developer diets. Poultry Science 1985; 64(5):669–674.

NRC (1994). National Research Council. Nutrient Requirement for Poultry. Ninth Revised Ed. National Academy Press, USA.

Omar M.A. (2003). Response of broiler chicks to a high olive pulp diet supplemented with two antibiotics. Dirasat, Agricultural Sciences **30(2),** 11-16.

Perez, V. G.; C. M. Jacobs; J. Barnes; M. C. Jenkins; M. S. Kuhlenschmidt; G. C.

Rabayaa, E.; J.A. Omar and R.A.Othman (2001). Utilization of olive pulp in broiler rations. An-Najah National University Journal of Research **15,** 133-144.

Rogel, A. M.; D. Balnave; W. L. Bryden and E. F. Annison (1987). Improvement of raw potato starch digestion in chickens by feeding oat hulls and other fibrous feedstuffs. Aust. J. Agric. Res. 38:629–637.

Senkoylu N. and N. Dale (1999). Sunflower meal in poultry diets: a review. World's Poultry Science Journal 1999; 55(6):153-174.

Servili .M.; B. Sordini; S. Esposto; S. Urbani; G. Veneziani; I.D. Maio; R. Selvagginin and A. Taticchi (2014). Biological activities of phenolic compounds of extra vigin olive oil: review. Antioxidants Journal. 3:1-23.

Shakouri, M. D.; H. Kermanshahi and M. Mohsenzadeh (2006). Effect of different non starch polysaccharides in

semi purified diets on performance and intestinal microflora of young broiler chickens. Int. J. Poult. Sci. 5:557–561.

SPSS. (2008). SPSS User´s Guide Statistics. Ver. 17. Copyright SPSS Inc., USA.

Stark, A.H. and Z. Madar (2002). Olive oil as a functional food: Epidemiology and Nutritional Approaches. Nutrition Reviews. 60:170-176.

Surai, P. F.; E. Kutz; G.J. Wishart; R.C. Noble and B.K. Speake (1997). The relationship between the dietary provision of α- tocopherol and the concentration of this vitamin in the semen of chicken: effects on lipid composition and susceptibility to peroxidation. Journal of reproduction and Fertility **110:** 47-51.

Svihus, B.; H. Hetland; M. Choct and F. Sundby (2002). Passage rate through the anterior tract of broiler chickens fed on diets with ground and whole wheat. Br. Poult. Sci. 43:662–668.

Svihus, B. (2011). The gizzard: function, influence of diet structure and effects on nutrient availability. World's Poultry Sci. J., 67: 207-224.

Taklimi S.M.; H.Ghahri; J. Pour-Reza; H. Fazaeli and H. Lotfollahian (1999). Investigation into the possible use of olive pulp in commercial layer diets. British Poultry Science **40(S1),** 40-41.

Van Krimpen, M. M.; R. P. Kwakkel; C. M. C. van Peet-Schwering; L. A. den Hartog and M. W. A. Verstegen (2009). Effects of nutrient dilution and non-starch polysaccharide concentration in rearing and laying diets on eating behavior and feather damage of rearing and laying hens. Poult. Sci. 88:759–773.

Van Scest, P.J.; J.B. Robertson and A. Lewis (1991). Methods of dietary fiber, neutral detergent fiber and nonstaech polysaccharides in relation to animal nutrition. Journal dairy Science 74:3583-3597.

Varastegani A. and I. Dahlan (2014). Influence of dietary fiber levels on feed utilization and growth performance in poultry. Journal of Animal Production Advances 4(6):422-429.

الملخص العربي

تأثير مستويات مختلفة من الألياف في العليقة علي الأداء التناسلي والاقتصادي لزكور دجاج السينا المحلي

عبده جاد عبد الله ، ملاك منصور بشاره ، ياسر صديق رزق ، أحمد فرج إبراهيم
معهد بحوث الإنتاج الحيواني- مركز البحوث الزراعية- الدقي- الجيزة

اجريت الدراسة الحالية لبحث الأداء التناسلي والإقتصادي الناتج عن استخدام مستويات مختلفة من الألياف الخام في علائق ذكور السينا المحلية وذلك في الفترة من ١٥- ٤٠ اسبوع من العمر. استخدم في هذا البحث عدد ١٨ ديك سينا تم توزيعها في تصميم تام العشوائية وتغذيتها علي مستويات أعلي من الألياف الخام حيث تم تغذية طيور المقارنة علي عليقة تحتوي علي ٣,٦٥ % الياف خام واحتوت باقي المامالات التجريبية علي مستويات اعلي من الألياف الخام في العليقة وذلك نتيجة استخدام مستويات مختلفة من كسب دوار الشمس ومن تفل الزيتون وخليط بينهما في العلائق التجريبية. وقد تم تغذية ١٨٠ دجاجة بياض علي عليقة بياض تحتوي علي ١٧% بروتين و٢٧٥٠كيلو كالوري طاقة ممثلة/كيلوجرام عليقة . ويمكن تلخيص النتائج المتحصل عليها فيما يلي:

١- سجلت الديوك المغذاه علي عليقة تحتوي علي ٥,٩ و ٤,٦٥ %الياف خام (١٤% و ٧% كسب دوار الشمس) وزن جسم أقل من الذكور المغذاه علي العليقة المقارنة وأيضا ادت التغذية علي نفس المعاملات الي انخفاض معنوي للتغير في وزن الجسم مقارنة بالعليقة المقارنة.
٢- زادت الحركة الكلية للحيوانات المنوية للذكور التي تم تغذيتهاعلي العليقة المحتوية علي ٦,٠٢% الياف خام (٧% كسب دوار الشمس + ٥% تفل الزيتون) مقاربة بالعليقة المقارنة.
٣- تحسنت كل من الحركة التقدمية وتركيز الحيوانات المنوية بزيادة مستوي الألياف في العليقة من ٣,٦٥% الي ٦,٠٢% (٧% كسب دوار الشمس + ٥% تفل الزيتون).
٤- تحسنت الخصوبة % معنويا في البيض الناتج من الدجاجات التي لقحت بالديوك المغذاه علي عليقة تحتوي علي ٥,٩٥ % ألياف خام (١٤% كسب دوار الشمس) بحوالي ٧,٨٩٥ مقاربة بالعليقة المقارنة.
٥- زادت معنويا نسبة الفقس % من البيض الكلي بالتغذية علي العلائق المحتوية علي ٥,٩% الياف خام (١٤% كسب دوار الشمس) يليها العلائق المحتوية علي ٥,٤٥ و٤,٧٧ % الياف خام (٧% كسب دوار الشمس و ٥% تفل الزيتون) علي التوالي وذلك مقارنة بالعليقة المقارنة.
٦- أدت التغذية علي العلائق المحتوية علي ٤,٧٧ و٦,٠٢% الياف خام (٥% تفل الزيتون و ٧% كسب دوار الشمس + ٥% تفل الزيتون) الي ذيادة معنوية في نسبة الفقس % من البيض المخصب بحوالي ٣,٣٨% مقارنة بالعليقة المقارنة.
٧- تحسنت معنويا الكفاءة الإقتصادية لنسبة الفقس التجارية بالتغذية علي العليقة المحتوية علي ٥,٩٥% الياف خام (١٤% كشب دوار الشمس) يليها العلائق المحتوية علي ٤,٧٧ و ٤,٦٥ % الياف خام (٥% تفل الزيتون و ٧% كسب دوار الشمس) علي التوالي مقارنة بالعليقة المقارنة.

اوضحت نتائج التجربة الحالية ان ذكور طيور دجاج السينا المحلية تحتاج الي مستويات معتدلة من الألياف الخام تتراوح من ٤,٦٥ الي ٦% الياف خام (٤% تفل الزيتون و ٧% و ١٤% كشب دوار الشمس) في الفترة من ١٥- ٤٠ اسبوع من العمر وذلك للحصول علي أفضل اداء تناسلي واقتصادي.