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EFFECT OF FEEDING OLIVE CAKE SUPPLEMENTED WITH OR WITHOUT BENTONITE ON PERFORMANCE OF GROWING RABBITS.

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This study carried out to determine the effects of substitution with 30 and 60% of olive cake instead of dietary clover hay in the diet without or with bentonite at levels of 0.5 or 1%on growing rabbit performance. Eighty-four weaning New Zealand White (NZW) rabbits about 6 weeks old and 789 ± 37.59g average live body weight were randomly assigned to seven groups, each with three replicates (of 4 rabbits) in a growth trail lasted for 8 weeks. Experimental diets were as follows: diet 1: A control without olive cake, diets 2, 3 and 4: 30% of clover hay was replaced with olive cake and diets were supplemented with zero, 0.5 and 1% bentonite respectively, diets 5, 6 and 7: 60% of clover hay was replaced with olive cake and diets were supplemented with zero, 0.5 and 1% bentonite, respectively. ***Results could be summarized as follows:***

1- *Feeding rabbits on diets with 30% olive cake plus 1% bentonite significantly resulted in the best final body weight, daily weight gain, feed conversion ratio, dressing %, ether extract digestibility coefficient, nitrogen balance and DE also it gave the highest relative economic efficiency. However, feed intake, digestibility coefficients of DM, OM, CP, CF and nutritive value in terms of TDN and DCP were not significantly affected by the different treatments.*
2- *Feeding rabbits on diets with 30% olive cake plus 1% bentonite significantly resulted in the best total volatile fatty acids concentration. However, ammonia concentration was not significantly affected by the different treatments.*
3- *Data showed significantly increased in globulin with 30% olive cake with or without bentonite. However, there were significantly decrease in the value of plasma cholesterol and total lipids for rabbits fed on diets 30% olive cake plus 0.5 and 1%.*

***Conclusively**, it could be recommended to incorporate olive cake with nucleus at the rate of 30%of the rabbit diets to replace clover hay provided that supplementing the diet with 1% bentonite to improve the performance and economic return of the rabbit production.*

Keywords: Olive cake, Bentonite, Rabbits, Growth, Digestibility, blood constituents and cecum characteristics.

Attempts have been made to use agricultural and industrial by-products as feed ingredients. Improved utilization of crop residues and by-products to be used in animal feeding deserves more attention. Examples of crop residues and agricultural by-products include cereal bran, citrus pulp, tomato pulp, poultry litter and olive cake. Olive Cake (OC) is the solid residue obtained after olive oil extraction. Olive cake quantities can vary according to the manufacturing process. Taking 30 % as the average value for proportion of crude olive cake to processed olives (Nefazaoui, 1983), OC production in Egypt is estimated to be 135000 tons, which represents 4.65% of the world crude olive cake production (2 900 000 tons). It includes olive skins, pulp and stones. The utilization of olive cake as animal feed is undoubtedly a good way of recycling this by-product. However, OC contains small amounts of organic nitrogen and a large proportion of cell wall constituents, which renders it unpalatable and poorly digestible (Rowghani *et al*., 2008). The cellulose content in OC ranges between 14% and 26%, but this significant amount of energy source is locked in ligno-cellulosic complex (Yansari *et al*., 2007). Sadeghi *et al*., (2009) found that OC contains 7.60% crude protein, crude fiber 38.7%, ether extract (5.7%) and NFE (40.06%) NDF (68.9%), ADF (51.2%) and lignin (31.3%) and El-Sheikh (2012) found that OC contains high level of tannins (12.05%). Dietary tannins inhibit the intestinal uptake and transport of simple sugars, amino acids and minerals (Kim and Miller, 2005). Attempts to improve the nutritive value of OC have been made through different chemicals (alkaline, acidic or oxidative agents). A among these, alkali agents (sodium hydroxide, ammonia and urea) have been most widely investigated, but results have been more or less satisfactory (Rowghani *et al*., 2008). Kadi *et al*., (2004) concluded that OC can be included in fatting rabbit diets at the level of 20% in replacement of alfalfa as source of crude fiber without significant effects on main parameters of growth. On the other hand, El-Sayaad *et al*., (2009) showed that 15% olive cake with gamma irradiation at 20kGy can be used in rabbit diet without negative effects on growth performance.

Clay represent one of natural feed additives in rabbit and other animal diets. Clay given to the animals in the diet, firmly and selectively binds

compounds present in the diet, which are noxious to the intestine and thus decrease their absorption through intestinal mucosa into the organism and prevents their toxic mode of action. A number of studies confirmed that clay capability to decontaminate aflatoxin (Abdel-Wahhab *et al*., 1999), plant metabolites (alkaloids, tannins), diarrhea causing enterotoxins (Dominy *et al*., 2004) and poisons (Knezevich and Tadic, 1994). Ayyat *et al*., (2000) found that the supplementing with natural clay (bentonite) in rabbit diets contaminated with the pesticide decreased the mortality rate (3.3% vs. 16.7%).

Therefore, the aim of the present study was to investigate the possibility of replacing clover hay by olive cake with or without bentonite for 30% or up to 60% and their effects on productive performance of growing rabbits.

MATERIALS AND METHODS

The experimental work of this study was carried out at Borg-El Arab, Experimental station. Animal Production Research Institute, Egypt. A total number of Eighty-four weaning New Zealand White rabbits at 6 weeks of age and nearly equal average initial live body weight (789± 37.59g) were randomly assigned to seven experimental treatment groups (n=12 in each). Olive cake with nucleolus was included in diets at levels of zero, 30 and 60% instead of clover hay. Also, benonite was supplemented at the rate of zero, 0.5 and 1%. The experimental period lasted for 8 weeks. Benonite was obtained from Sinai Manganese Company, Cairo Egypt. Benonite contained the following oxides SiO_2 49-55%; Al_2O_3 20-24%; Fe_2O_3 2.6- 6%; CaO 0.2-6%; Na_2O 1.1- 24%; MgO 0.5-2% and K_2O 1.2-1.4%.

Rabbits were fed *ad libitum* formulated diets according to NRC (1977). While, DE content was calculation according to Cheeke (1987). Ingredients and chemical composition of the experimental pelleted diets are shown in Table 1. Chemical composition of olive cake compared with clover hay in Table 2. Water was always freely available. Animals were housed with a constant photoperiod of 16 hours light: 8 hours dark lighting schedule. Rabbits in all treatments were kept under similar management hygienic and environmental conditions during the experimental period.

Live body weight was determined weekly throughout the experimental period, and weight gain was calculated. Feed consumption was determined precisely and calculated as grams per rabbit per day, during the all experimental period.

Table 1. Ingredients and chemical composition of experimental diets (on DM basis).

Ingredients	Control diet	30% Without bentonite	30% With bentonite 0.5%	30% With bentonite 1%	60% Without bentonite	60% With bentonite 0.5%	60% With bentonite 1%
Clover hay	33.00	23.10	23.10	23.10	13.20	13.20	13.20
Olive cake meal	-------	9.90	9.90	9.90	19.80	19.80	19.80
Bentonite	--------	------	0.50	1.00	------	0.50	1.00
Barely	14.00	14.50	14.00	13.50	14.50	14.00	13.50
Wheat bran	15.00	15.50	15.50	15.50	15.00	15.00	15.00
Yellow corn	14.50	12.70	12.60	12.60	11.70	11.70	11.70
Soybean meal (44% CP)	17.00	17.80	17.90	17.90	19.20	19.20	19.20
Lime stone	0.75	0.75	0.75	0.75	0.85	0.85	0.85
Di calcium phosphate	2.00	2.00	2.00	2.00	2.00	2.00	2.00
NaCl	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Premix*	0.30	0.30	0.30	0.30	0.30	0.30	0.30
DL-Methionine	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Anticoccidia (Diclazuril)	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Molasses	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Chemical analysis (%)							
DM%	89.19	89.16	89.44	89.16	89.63	89.56	89.19
Chemical analysis % (on DM basis)							
OM%	90.37	90.30	90.13	90.17	90.29	90.05	90.02
CP%	16.62	16.40	16.38	16.30	16.29	16.23	16.17
CF%	13.86	14.26	14.24	14.17	14.52	14.50	14.47
EE%	2.37	2.74	2.76	2.74	3.15	3.14	3.13
Ash%	9.63	9.70	9.87	9.83	9.71	9.95	9.98
NFE%	57.52	56.90	56.75	56.96	56.33	56.18	56.25
**DE(kcal/kg)	2493	2480	2481	2483	2471	2472	2473
Calculated analysis%							
Calcium	1.28	1.20	1.21	1.22	1.16	1.17	1.18
Total phosphorus	0.791	0.778	0.776	0.774	0.763	0.761	0.759
Methonine	0.356	0.360	0.360	0.359	0.368	0.367	0.366
Lysine	0.866	0.906	0.907	0.905	0.958	0.956	0.954

*** Each per 1 kg diet:** 6000 IU Vit. A; 900 IU, Vit. D_3; 40 mg, Vit.E; 2.0 mg, Vit. K_3; 2.0 mg Vit.B_1; 4.0 mg , vit. B_2; 2.0 mg, Vit. B_6; 0.010 mg, Vit.B_{12}; 5.0 mg Vit.PP; 10.0 mg Vit., B_5; 0.05 mg, B_8; 3.0 mg, B_9; 250 mg, choline; 50.0 mg, Fe;50.0 mg, Zn; 8.5 mg Mn; 5.0 mg Cu; 0.20 mg I, and 0.01 mg Se.

**DE (kcal/g) = 4.36 -0.0491x NDF, Where NDF %=28.924+0.657xCF%, according to Cheeke, (1987).

Table 2. Chemical analysis of olive cake with nucleolus compared to clover hay (on DM basis).

Items	Olive cake with nucleolus	Clover hay
DM%	90.87	83.62
Chemical analysis% (on DM basis)		
OM%	93.60	88.94
CP%	6.21	13.36
CF%	33.20	31.00
EE%	6.43	1.45
NFE%	47.76	43.13
Ash%	6.40	11.06
DE(kcal/kg)*	1868.8	1939.81
Tannins %	9.67	3.53
Cell wall constituents:		
NDF	58.21	55.11
ADF	46.30	42.00
ADL	23.54	18.43
Hemi cellulose	11.91	13.11
Cellulose	22.76	23.57

* DE (kcal/g) = 4.36 -0.0491x NDF, Where NDF% = 28.924+0.657x CF% (according to Cheeke, 1987).

NDF: Neutral detergent fiber, ADF: Acid detergent fiber, ADL: Acid detergent Lignin Hemi cellulose: NDF-ADF; Cellulose: ADF-ADL.

A total number of 28 males (4 males in each group) were used in carrying out the digestibility trial for determining nutrient digestibility co-efficient of the tested diets. Animals were housed individually in cages that allowed the separation of feces and urine. All rabbits were kept under the same management, hygienic and environmental conditions. The experimental diets were offered twice daily at 9 a.m. and 15 p.m. and fresh water was provided *ad libitum*. Survey of daily feed consumption was recorded. Any possible feed contamination was removed from the feces. Samples of daily feces of each rabbit were taken and oven dried at 60º C for 48h, then was ground and stored for proximate chemical analysis. Samples of feed and feces were analyzed for dry matter (DM), crude protein (CP), ether extract (EE), crude fiber (CF), and ash according to the classical A.O.A.C (2000) methods. NDF, ADF and ADL were analyzed according to Van Soest *et al.*, (1991).The nutritive value of the experimental diets as DCP and TDN value were calculated according to Cheeke (1987). Tannins in olive cake were analyzed according to Makkar and Googchild (1996). Urine was collected into buckets containing 100 ml of H_2SO_4 (10%) to prevent N losses. The volume of urine at each sampling was recorded and sub - sample (10%) was taken for each

rabbit and stored at -20 ^{o} C for analysis of total N. At the end of the experimental period (14 weeks of age), four rabbits were randomly taken from each group and fasted for 12 hours before slaughtering to determined carcass characteristics according to Steven *et al*. (1981), as follows:

Dressing % = Dressing weight x 100 / Pre- slaughter body weight.

Where, Dressed weight = Weight of empty carcass with head + Giblet weight.

Giblet weight = Weight of liver + kidneys+ heart تراجع فى الجدول

Also, rabbits assigned to slaughter test were used to study cecum characteristics (Total volatile fatty acids (Eadie *et al*. ,1967). While, ammonia was determined according to (Conway, 1958). Blood plasma including total lipids (Zollner and Kirsch, 1962), cholesterol (Trinder, 1969) creatinine (Schirmeister, 1964), urea (Fawcett and Scott, 1960), protein (Gornal *et al*., 1949), albumin (Doumas and Waston 1971), transaminase (AST, aspartate aminotransferase and ALT alanine aminotransferase, Reitman and Frankel (1957) were measured.

The economic efficiency (EEF) was calculated according to the following equation: EEF = Net revenue / total costs Where the total cost calculated by Egyptian pound (L.E) in the local market at the time of experiment.

All data were subjected to analysis of Variance Using The General Linear Models (GLM) Procedure of SAS (2004).

$$Yij = \mu + Ti + e_{ij},$$

Where: μ= Overall mean of Yij, T = Effect of treatment) and e_{ij}= Experimental error.

The Significant differences between treatment means were separated at alpha level (P≤0.05) by Duncan's multiple range test (1955).

RESULTS AND DISCUSSION

Chemical composition of olive cake with nucleolus compared to clover hay

Chemical composition of olive cake varies widely due to the oil extraction method, year of harvest and geographical origin of olives (Moic *et al*. 2007). Proximate chemical analyses, of olive cake compared to clover hay are shown in Table 2. The results showed that olive cake, in comparison to the clover hay could be recommended as a good alternate, where it contained close DE content (1868.80 *vs*. 1939.81 K cal/kg), crude fiber (33.20 *vs*. 31.00%), but higher ether extract (6.43 *vs*. 1.45%) and NFE content (47.76vs. 43.13%), NDF (58.21 *vs*. 55.11%), ADF (46.30 *vs*. 42.00%), ADL (23.54 *vs*. 18.43%) and tannins (9.67 *vs*. 3.53). but lower

crude protein (6.21 *vs.* 13.36%), Hemi cellulose (11.91 *vs.* 13.11%), cellulose (22.76 *vs*. 23.57).

The chemical composition of olive cake has similar trend that reported by Salama (2013) who found that olive cake with nucleolus contained 7.68% CP, 27.11% CF, 9.20% EE and 31.01% NFE. Sadeghi *et al*., (2009) found that olive cake content 7.60% CP, 38.7% CF, 5.7% EE and 40.06% NFE, 68.9% NDF, 51.2%ADF and 31.3% lignin. On the other hand, Vera *et al*., (2009) found that olive cake content 6.2% CP %, 16.5 % EE, 32.0% NDF 25.5% ADF and 15.5 % ADL. Also, Salama (2013) found that olive cake contains high level of tannins (11.09%) and El-Sheikh (2012) found that olive cake contains high level of tannins (12.05%).

Growth performance

Results of growth performance are illustrated in Table 3. It could be noticed that significant differences in final body weight, total body weight gain and daily body weight gain between treatments.

Rabbits received 30 % olive cake plus 1 % bentonite had the highest final body weight, total body weight gain and daily body weight gain and feed conversion ratio compared to the other treatments. In this respect, Ben Rayana *et al*., (1994) reported non significant differences in daily gain and feed efficiency for rabbits fed diets containing 0, 11.5 or 23% olive cake. Also, El-Kerdawy (1997) found no significant differences in live body weight and weight gain of rabbits fed diets included 5, 10 and 15% olive pulp. Mousa and Abd El-Samee (2002) observed no significant differences in final weight and daily body weight gain for rabbits fed diets containing 0, 10 and 20% olive pulp.

The improvement in growth performance for rabbits fed diets supplemented bentonite than rabbits fed diets without bentonite may be attributed to reduction the total viable counts of pathogenic bacteria and increasing the beneficial bacteria in the small intestine which reflected on improvement the rate of passage, thickness of intestinal mucosa, nutrient digestibility and absorption (Xia *et al*., 2005). Moreover, Anirudhan *et al*., (2006) bentonite could be adsorbent tannin. Also, Ambula *et al*., (2003) found that bentonite bind sorghum tannins. Dominy *et al*., 2004) found that clay is capable to decontaminate plant metabolites (alkaloids, tannin). Also, bentonite could improve the digestibility and utilization of nutrients in diets, influencing activities of the hormones such as growth hormones and thyroid hormones (Adu and Egbunike, 2010). In this connection, Damiri *et al*., (2012) found that addition of 3.75% sodium bentonite to diet decreased feed intake and some parameter of performance such as weight again.

***Carcass characteristics**:*

Results in Table (4) indicated that rabbits fed 30 % olive cake plus 1% bentonite diet had significantly increase of empty carcass with head, liver, edible giblets and dressing (%). However, there were insignificant differences in heart and kidney percentage between all treatments. In this connection, Tortuero *et al*. (1989) reported that carcass yield and liver weight were not affected by olive pulp inclusion. Also, Ben Rayana *et al*. (1994) observed no significant differences in carcass traits of rabbits fed either control or 11.5% olive pulp diets. However, they found significant decrease in carcass traits for those fed diet with 23% olive Pulp. El-Kerdawy (1997) found that carcass weight, giblets weight and dressing percentage did not differ significantly with including up to 15% olive Pulp meal in rabbit diets. Also, Abd El-Naby (1998) observed no significant differences in dressed, liver, edible giblets organ percentage when rabbits were fed diets containing olive cake meal as a substitute of wheat bran. Abd El-Galil (2001) observed non significant differences in carcass traits of rabbits fed either control or 20% olive pulp meal. Mousa and Abd El-Samee (2002) found that the carcass weight, giblet weight, empty alimentary tract and dressing percentage did not differ significantly with up to 20% olive pulp meal of rabbit diets.

Digestibility coefficients, nutritive value and nitrogen balance of nutrients

Digestibility coefficients, nutritive value and nitrogen balance of the experimental diets are presented in Table 5. The incorporation of olive cake in rabbit diets resulted in non significant differences in digestion coefficients of dry matter (DM), organic matter (OM), crude protein (CP) and crude fiber (CF). However, the differences were significant for the digestibility coefficients of ether extract (EE) and NFE.

Feeding 30 and 60% olive cake with or without bentonite increased digestibility coefficient of EE when compared with control group. These results are in agreement with those reported by Mehrez and Mousa (2011) who replaced of barley grains (0, 20, 25 or 30%) by olive pulp (without nucleolus) in the diets of growing rabbits and showed that the digestibility coefficients of ether extract significantly increased and by inclusion olive pulp level. This may be explained the positive effect of supplemented the bentonite that adsorb lipase enzyme to increase its activity (Ghiaci, *et al.,* 2009).

Results showed that DCP and TDN were no different affected by olive cake levels. However, there were significantly increased in DE with 30% olive cake supplemented with 1% bentonite .In this connection, Moustafa *et al*. (2008) found that the values of TDN and DCP for the buffalo diets contained 25 to 30% of olive pulp were lower than that containing 15 to

20% level of olive pulp. Alzueta *et al.*, (2002) reported that dietary supplementation with clay or bentonite improved the nutrient digestibility and enzymatic activity of gastrointestinal secretion. Nitrogen balance was significantly higher with diet containing 30% olive cake supplemented with 0.5 and 1 % bentonite compared to the control diet and the other experimental groups. On the other hand, including 60 % olive cake without bentonite and plus 0.5 % bentonite in the diet recorded the lowest ($P \leq 0.05$) values of nitrogen balance%. These findings could be attributed to the negative effect of polyphenols or tannins which were found in olive cake (Theriez and Boule, 1970).

Cecum activity

Results of the total volatile fatty acid and ammonia concentration of caecal contents are shown in Table 6. Analysis of variance of total volatile fatty acid revealed that rabbits fed 30% and 60% olive cake without benonite were significantly ($P < 0.05$) lower than the control. Ammonia concentration were no significantly different between treatments. Abdel-Rahman *et al.*, (2011) found that increased total volatile fatty acids (VFAs) concentration associated with a decrease in NH3-N concentration by addition of 2.5% bentonite in rabbit diet. The tendency to lower NH3-N concentrations could be attributed either to a greater ammonia utilization by cecal microbes or to the great ability of bentonite to adsorb ammonia when present at high concentrations reported by Saleh (1994).

Blood plasma constituents

Effects of dietary treatments on blood plasma parameters are shown in Table 7. Data for albumin, creatnine, ALT, AST, urea showed that there were no significant differences between the experimental groups. However, there were significantly increased in globulin with 30% olive cake with or without bentonite and 60% with 0.5 and 1% supplemented with bentonite compared with control groups. Total protein of the rabbits fed 60% olive cake without bentonite diets was significantly ($P<0.05$) lower than those of control group. Plasma cholesterol and total lipids were significantly higher with 60% without bentonite and 60% olive cake with 0.5% bentonite diets compared to the control rabbits.

Results indicated that total protein slightly decreased with 60% without bentonite may be due to the lower digestibility of CP in the diet. In this respect, Mousa (2000) observed no significant differences in serum concentrations of albumin, globulin, total lipid, glucose, creatinine, AST, ALT and urea-N- by feeding the growing lambs 25% olive pulp. Also, Mehrez and Mousa (2011) found that concentration of total protein, albumin

globulin, cholesterol, urea-N-, AST and ALT did not differ significantly with olive pulp inclusion in rabbit diet at levels of 20, 25 and 30%. El-kerdawy (1997) reported that levels of total protein, AST, ALT and creatinine were not significantly affected by olive pulp inclusion. Also, Mousa and Abd El- Samee (2002) reported that the concentration of serum globulin, total lipid, glucose, creatinine, AST and ALT did not differ significantly among the experimental groups due to olive pulp feeding.

Economic evaluation:

Final body weight, length of the growing period and feeding cost are generally among the most important factors involved in achievement of maximum efficiency values of meat production. The relative economic efficiency (REE) of the different formulated diets as affected by different treatments is shown in Table 8. It should be pointed that the Relative economic efficiency values were calculated according to the prevailing market selling price of 1 kg LBW.

Results indicated that using olive cake in growing rabbit diets improved slightly the net revenue and reduced the total feed cost . The lowest total feed cost / rabbit (8.42 LE) was observed with rabbits fed the diets 60% olive cake with 0.5% bentonite followed by that fed 60% olive cake without bentonite (8.46). Data showed that 30% olive cake with 1% bentonite to growing rabbit gave the best economic efficiency (4.52) followed by 60% olive cake with 0.5% bentonite and 30% olive cake with 0.5% bentonite (4.41and 4.27), when compared to the control group (3.71), respectively. The results indicated that 30% olive cake with 1% bentonite followed by 60% olive cake with 0.5% bentonite and 30% olive cake with 0.5% bentonite as a partial replacement for clover hay improved the REE of diets by 121.83, 118.86% and 115.09%, .respectively when compared with the control diet. The results of this study are in agreement with those of Mehrez and Mousa (2011) found that feeding growing rabbits on diets containing 20, 25 and 30% olive pulp decreased the cost of feed per kg gain by 9.30, 19 and 21.5%, While economic the efficiency values were raised with olive pulp supplementation by 15.99, 36.86 and 42.96% respectively, compared with rabbits fed the commercial diets. The same trend was noticed for the Mostafa *et al*., (2003) who found that the feed cost per kg gain were relatively lower than the control when lambs were fed rations contained 15-35% olive cake. Salama (2013) showed that hens fed 10% olive cake and 3% clay had the best value of economical efficiency.

Conclusively, from these results it could be concluded that olive cake with nucleus can be incorporate in rabbit diets up to 30% with 1% bentonite to get the best productive performance and economical efficiency.

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تأثير التغذية على تفل الزيتون بدون أو مع إضافة البنتونيت على الأداء الأنتاجى للأرانب النامية.

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أجريت هذة التجربة لدراسة تأثير إستخدام ٣٠ أو ٦٠% تفل الزيتون إحلال من دريس البرسيم بدون أو مع إضافة بنتونيت بمستوى ٠,٥ أو ١% على الأداء الأنتاجى للأرانب النامية. تم تقسيم ٨٤ أرنب نيوزيلاندى أبيض مفطوم عمر ٦ أسابيع عشوائيا بمتوسط وزن ٧٨٩ ± ٣٧,٥٩ الى ٧ مجموعات في كل مجموعة ٣ مكررات (٤ أرانب فى كل مكرر) ، واستمرت تجربة النمو لمدة ٨ أسابيع, وكانت العلائق التجربية كالتالى: العليقة الأولى وهى عليقة كنترول ,عليقة التانية, الثالثة والرابعة تحتوى على ٣٠% تفل الزيتون محل الدريس مع أضافة البنتونيت بنسبة صفر , ٠,٥ و١% على التوالى , وعليقة الخامسة, السادسة والسابعة تحتوى على ٦٠% تفل الزيتون محل الدريس مع أضافة البنتونيت بنسبة صفر , ٠,٥ أو ١% على التوالى . **يمكن تلخيص النتائج كما بلى:**

١- وجود تحسن معنوى فى وزن الجسم النهائى, الزيادة الوزنية اليومية, كفاءة التحويل الغذائى , النسبة المئوية للتصافى , معاملات هضم الدهن ميزان الأزوت والطاقة المهضومة وأيضا أعلى كفاءة إقتصادية عند تغذية الأرانب على علائق تحتوى على ٣٠% تفل الزيتون مع أضافة ١% بنتونيت. بينما لم يلاحظ أى تأثير معنوى بين المعاملات المختلفة فى إستهلاك الغذاء, معاملات هضم المادة الجافة , المادة العضوية , البروتين, الألياف , المركبات الكلية المهضومة والبروتين المهضوم .

٢- وجود تحسن معنوى فى تركيز الأحماض الدهنية الطيارة عند تغذية الأرانب على علائق تحتوى على ٣٠% تفل الزيتون مع أضافة ١% بنتونيت بينما لم يلاحظ أى تأثير معنوى بين المعاملات المختلفة فى تركيز الامونيا.

٣- أظهرت النتائج وجود زيادة معنوية فى الجليوبولين مع الأرانب المغذاه على٣٠% تفل الزيتون مع أو بدون إضافة بنتونيت . بينما وجد نقص معنوى فى كوليسترول واللبيدات الكلية مع الأرانب المغذاه على ٣٠% تفل الزيتون بنسبة ٠,٥ و١% .

التوصية: يمكن التوصية ان إستبدال تفل الزيتون بالنواه محل دريس البرسيم فى علائق الأرانب حتى مستوى ٣٠% مع أضافة ١% بنتونيت يحسن من الأداء الأنتاجى والكفاءة الأقتصادية للأنتاج الأرانب.