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EFFECT OF OLIVE CAKE SUBSTITUTION OF WHEAT BRAN IN THE FEED MIXTURES OF GROWING NEW ZEALAND RABBITS.

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SUMMARY

A total of sixty weanling male White New Zealand rabbits of four weeks of age were blocked by weight divided into five similar groups. Each group was divided into three replicates each of four rabbits. Rabbits of each replicate were placed in wire single floor cage. In this study Olive cake (OK) was incorporated into the basal diet to replace wheat bran (WB) with the percentage of 0, 25, 50, 75 and 100% of the diet. All the experimental diets have nearly the same level of crude protein (CP) and all diets were fed in pellets. The diets were formulated to cover the nutrient requirements of rabbits according to NRC 1977. The criteria studied were live weight (LW), weight gain(WG), feed intake(FI), feed conversion (FC), digestibility coefficients (DC) and the nutritive values (DCP, TDN and DE) of tested diets. The slaughter trail was carried out at the end of the experiment on three representative rabbits from each treatment. The economic efficiency (EE) was also calculated. The results obtained seemed to justify the following conclusion: Rabbits fed at all levels of (WB) substitution consumed 6.6-13.6% less feed intake (FI) than those fed the basal diet. The average gain (AG) per kg total digestible nutrients (TDN) consumed during the whole experimental period indicated the superiority of total replacement of WB by OK (9.7%) more than that of the control group. Carcass % without head was the highest in control group (50.55%) while that of OK diets was ranged from 48.18 to 50.32% recording 4.69% lower than that of the control group. The inclusion of OK to replace 25-100% of WB in rabbit diets is economically effective. The nutritive values as DCP, TDN and DE were nearly similar by increasing the dietary OK in the rabbit up to 75%, while there is an adverse effect on these feeding values by increasing OK level up to 100%. Finally from economic point of view, it appears that the inclusion of OK to replace 75% of WB in rabbit diets is economically effective.

***Keywords**: Olive cake, rabbits, digestion coefficients, carcass characteristics, economical evaluation.*

INTRODUCTION

Feed is the largest single item in the cost of producing rabbit meat representing at least 65% of the total production cost. For this goal, there is urgent need to evaluate by-products which are extremely important to formulate least cost rabbit diets. Wheat bran is the coarse outer covering of the wheat kernel as separated from cleaned and scoured wheat in the usual process of commercial milling. Wheat residues are good sources of iron and manganese and because of their bulky nature. Bran was the only foodstuff of all rationed material allowed for rabbit breeder during the past war rationing. Bran is only suitable for drying off wet masks and because it enjoys a reputation for stimulating milk production and is also laxative in mature, is usually more expensive than its more feeding values merit. More than 95% of the estimated world's olives are grown in the Mediterranean basin. The mplies that, following the extraction of oil by various procedures, there remains a variety of residues some of which may be exploited for ruminant livestock feeding. The pulp fraction is of principal interest as far as livestock feeding is concerned. It must be remembered, however that there is a wide variation in the processes used in the yield of residues and low these or amounts there of are combined in the final residue employed as feed. Appreciable amounts of the concentrate must be imported and the possibility of replacing some of it by a lower cost by-product such as olive pulp merits more than usual interest. Earlier research within Libya with both cattle and sheep yield promising results. No significant differences were noted in the performance of heifers (Razzaque and Omar 1981) and lambs (Razzaque *et al.*, 1980) when up to 50% of a concentrate mixture was replaced by olive residue. In a subsequent experiment, however, growing lambs were significantly reduced with a 40% inclusion rate (Aboayasha *et al.*, 1983). Rupic *et al.* (1999) reported that olive cake can be used in the rabbits without effect on their health. It is true to say that very little experimentation has been done to exploit olive residue for rabbit feeding. Therefore, the present study aimed to throw the light on olive cake meal as a partial or complete substitute of wheat bran in growing NZW rabbit diets.

MATERIALS AND METHODS

A total of sixty weaned male New Zealand white rabbits of four weeks of age were divided into 5 similar groups of (12) rabbits each. Each group was divided into 3 replicates of 4 rabbits. Rabbits of each replicate were placed in wire single floor cage. In this study Olive cake (OK) was incorporated into the basal diet (control diet) to replace wheat bran (WB) with the percentage of 0, 25, 50, 75 and 100% of the diet as shown in Table (1).

Table (1): Percentage composition and chemical analysis of experimental diets

Item	Experimental diets				
	0%	25%	50%	75%	100%
Barley	50.0	48.0	50.0	45.0	43.0
OK	00.0	5.5	11.0	16.5	22.0
Wheat bran	22.0	16.5	11.0	5.5	00.0
Sunflower meal	22.0	24.0	22.0	27.0	29.0
Molasses	2.0	2.0	2.0	2.0	2.0
Bone meal	2.8	2.8	2.8	2.8	2.8
Sodium Chloride	0.5	0.5	0.5	0.5	0.5
Vitamins and minerals mixture	0.5	0.5	0.5	0.5	0.5
DL-Methionine	0.1	0.1	0.1	0.1	0.1
L-Lysine	0.1	0.1	0.1	0.1	0.1
Total	100	100	100	100	100
Chemical analysis, %					
DM	91.16	90.93	90.82	91.54	89.48
OM	92.80	92.70	93.20	92.80	93.50
CP	16.81	16.79	16.74	16.60	16.20
CF	11.80	11.90	11.05	13.42	13.85
EE	4.22	3.90	3.98	4.02	4.66
NFE	59.97	60.11	61.43	58.76	58.85
Ash	7.20	7.30	6.80	7.20	6.50
Nutritive value, %					
TDN*	64.85	60.27	59.79	58.63	57.55
DE kcal/kg DM	2854	2673	2650	2551	2543
Cost of kg diet (L.E)	1.685	1.665	1.649	1.622	1.600

** Calculated according to digestibility trial*
Chemical composition of OK 91.0, 93.05, 24.61, 18.27, 7.57, 42.60 and 6.95 for DM, OM, CP, CF, EE, NFE and ash respectively.

Rabbits were housed in galvanized wire cages (50 x 40 x 40 cm) and provided with stainless steel feeders and automatic watering system. Fresh water and diets in pelleted form were offered ad lib during the experimental period. All rabbits were kept under same managerial, hygienic environmental conditions during the experimental period. All tested diets were iso caloric–iso nitrogenous. During the experimental period, rabbits were individually weighed to the nearest gram every week before offering the morning meal at 08.00 a.m. up to 13^{th} weeks of age. The average body weight, body weight gain, feed consumption, feed conversion were recorded and calculated weekly up to 13^{th} weeks of age (Table, 2). At the 13^{th} week of age three representative rabbits from each feeding group were taken at random to study the carcass characteristics. Digestion trials were conducted at the termination of the experiment to evaluate the experiment diets. Three rabbits per each treatment were used to determine the digestion coefficients of DM, OM, CP, CF, EE and NFE. Feces were collected daily for 7 days and dried at 60 C°, finely ground and stored for chemical analysis. The chemical composition of the experimental diets and feces were analyzed according to A.O.A.C (2000). The DE values of the experimental diets were calculated using the chemical composition according to the equation of Schiemann *et al.* (1972)

$$DE\ (kcal/g) = 5.28\ X_1 + 9.51\ X_2 + 4.2\ (X_3 + X_4).$$

Where:
X_1 = DCP (digestible crude protein, g/kg).
X_2 = DEE (digestible ether extract, g/kg).
X_3 = DCF (digestible crude fiber, g/kg).
X_4 = DNFE (digestible nitrogen-free extract, g/kg).

Economical efficiency of experimental diets was calculated according to the local market price of ingredients and rabbit live body weight as following:

Net revenue = total revenue – total feed cost.

Economical efficiency (%) = net revenue / total feed cost.

The obtained data were statistically analyzed using one way analysis of variance according to Snedecore and Cochran (1982).Duncan's (1955) new multiple range test were carried out when ever necessary according. The data were processed through the SAS program (1998).

RESULTS AND DISCUSSION

Productive performance of growing NZW rabbits:

Live weight, LWG, RGR, FI, EFU and MR of the experimental rabbits fed on different levels of OK are shown in Table (2). It is worthy note that all experimental rabbits have commenced with a nearly similar initial LBW at 5 weeks of age which ranged between 618.3 and 691.6 g with no significant differences as shown in Table (2). At 13 weeks of age, body weight (BW) was increased with OK diets to reach 1963.17 $\pm$ 27.95 g at 75% replacement level and slightly higher than other treatments, with 25 and 100%, but significantly ($P<0.05$) higher than the 50% OK diet. Body weight decreased slightly but the differences were not significant when compared with the control group. Rupic *et al.* (1999) found that the different proportion (10 & 20%) of olive cake added to feed had no adverse effect on final body mass of fattened rabbits. Also, Ahmed, (1998) reported that olive meal could be incorporated in broiler chick diets up to 8% for improving their growth.

Gain in weight and average daily gain followed the same trend as the weight at 13 weeks of age as shown in Table (2). Difference between the highest OK incorporation and the control group in DWG amounted 12.9%, While it reached 8.2% between 75% incorporation and the control one, also, a decreasing trend was observed from control diet to diet No.3 weight gain (DWG) during the whole experimental period (5-13 weeks) amounted 25.23, 22.69, 21.01, 23.02 and 21.86 g on diets 0, 25, 50, 75 and 100% OK incorporation respectively, showing that diet composition had no significant affect on DWG Table (2).

Average daily feed intake during the whole experimental period (5-13 weeks) was 80.63, 76.0, 69.70, 73.06 and 74.06 g for groups 1, 2, 3, 4 and 5 respectively. For comparison these figures would be 100, 94.3, 86.4, 90.6 and 91.9 at tested OK replacement level of 0, 25, 50, 75 and 100% of wheat bran respectively showing that rabbits fed at all levels of wheat bran substitution consumed 5.7-13.6% less FI than those rabbits fed on the basal diet. Rupic *et al.* (1999) found that the amounts of dried olive cake (10% and 20%) used in a daily diet did not improve feed consumption in fattened rabbits.

The feed conversion were 3.216, 3.390, 3.320, 3.170 and 3.410 feed/kg gain for the experimental groups 1, 2, 3, 4 and 5 respectively, showing a negative effect of total replacement of wheat bran (WB) by OK (3.216 in control group *VS* 3.410 in group 5). Rupic *et al.* (1999) found that rabbits which fed fodder containing no OK had the lowest level of food conversion, while those which fed on 20% OK had the best one. The present results show that it is possible to add OK to growing rabbit diets as completely replacement of WB without negative effect on their growth performance.

Table (2): Performance traits (Mean ± SE) of growing NZW rabbits fed experimental diets

Item	Experimental diets				
	0%	25%	50%	75%	100%
Live weight (g) at:					
5 weeks	618.3 ± 32.35	649.6 ± 36.51	662.1 ± 37.45	676.7 ± 14.73	691.6 ± 13.97
7 weeks	1021±37.72	998.3 ± 36.92	970.4 ± 48.02	1017.5 ± 35.40	997.5 ± 26.08
9 weeks	1397 ±71.61	1326 ± 47.38	1314 ± 71.88	1375.4 ± 36.67	1279.2 ± 44.20
11 weeks	1713^{a} ±80.12	1603^{b} ± 67.52	1548^{b} ± 44.19	1651.33^{ab} ± 17.38	1620^{ab} ± 1.61
13 weeks	2031.3^{a} ± 68.04	1920^{ab} ± 73.48	1838^{b} ± 25.56	1963.17^{ab} ± 27.95	1915.67^{ab} ± 62.81
Daily weight gain (g)					
5-7 weeks	28.77^{a} ± 1.89	24.91^{ab} ± 1.82	22.0^{b} ± 1.62	24.35^{ab} ± 2.22	21.85^{b} ± 1.99
7-9 weeks	26.86 ± 4.9	23.41 ± 2.63	24.57 ± 4.0	25.67 ± 3.22	20.12 ± 2.18
9-11 weeks	22.57 ± 5.73	19.79 ± 4.95	16.72 ± 4.1	19.70 ± 2.68	24.35 ± 4.05
11-13 weeks	22.72 ± 2.6	22.64 ± 5.07	20.72 ± 2.48	22.27 ± 1.17	21.12 ± 1.61
5-13 weeks	25.23 (100%)	22.69 (89.93%)	21.01 (83.27%)	23.00 (91.16%)	21.86 (86.64%)
Daily feed intake (g)					
5-7 weeks	66.50^{a} ± 1.78	56.50^{b} ± 0.76	50.25^{c} ± 3.66	66.75^{a} ± 1.92	68.25^{a} ± 0.89
7-9 weeks	90.50 ± 7.22	77.00 ± 4.89	87.75 ± 3.51	84.50 ± 2.71	77.00 ± 4.53
9-11 weeks	72.00^{ab} ± 3.05	65.50^{ab} ± 1.16	65.06^{ab} ± 2.97	62.00^{ab} ± 4.51	76.00^{a} ± 1.13
11-13 weeks	93.52^{ab} ± 4.89	105.00^{a} ± 5.15	80.73^{b} ± 1.61	79.00^{b} ± 1.96	75.00^{b} ± 2.19
5-13 weeks	80.63 (100%)	76.00 (94.3%)	69.7 (86.4%)	73.06 (90.6%)	74.06 (91.9%)
Feed conversion (F/G)					
5-7 weeks	2.313^{b} ± 0.20	2.26^{b} + 0.19	2.28^{b} ± 0.14	2.74^{ab} ± 0.68	3.12^{a} + 0.53
7-9 weeks	3.35 ± 0.54	3.29 + 0.53	3.57 ± 0.66	3.29 ± 0.63	3.83 + 0.51
9-11 weeks	3.191^{b} ± 0.65	3.36^{a} + 1.38	3.58^{a} ± 2.02	3.13^{b} ± 0.71	3.12^{b} + 0.78
11-13 weeks	4.11 ± 0.52	4.65 + 2.22	3.99 ± 0.87	3.54 ±0.16	3.55 + 0.36
5-13 weeks	3.216 (100%)	3.39 (105.4%)	3.32 (103.2%)	3.17 (98.8%)	3.41 (105.9%)
Mortality rate %					
5-13 weeks	10.41	12.49	14.57	22.49	4.16

a,, b and c: Means in the same row having different superscripts differ significantly (P<0.5).

Mortality rate (MR) did not exceed 8.33% during the first 4 weeks of the experiment. It increased during the following period (9-11 weeks of age) when OK replaced WB at a rate 50 and 75%. It is worthy to note that the complete replacement of WB by OK recorded the lower MR (4.16%). Also the control group recorded the highest MR during the last 2 weeks of the experiment. It was nil in the OK substitution level from 75 up to 100% of wheat bran.

Carcass characteristics:

Hot carcass % without head was the highest in control group (50.55%), while that of OKM diets was (dressed weight) ranged from 48.18 to 50.32% recording 4.69% lower than that of the control group Table (3). Kadi *et al.* (2004) found that the slaughter yield (68.23% *VS* 66.64%) seems better with rabbits consuming the experimental diets (0 *VS* 20% crude olive cake). The weight of edible internal organs (EIO), (liver + head + kidney) was higher from 6.9% in group 3 (50% OK), 5.75% in group 4 (75% OK), 5.63% in group 5 (100% OK), 5.54% in group 1 (control) and 5.26% in group 2 (25% OK). The offal's parts (blood + alimentary canal + head + fur + legs and tail) as percentage from that of pre-slaughter weight were the highest in control group (42.35%), while that of OK diets were ranged from 38.76 to 44.36% recording 3.59- 2.01% lower than that of the control group. It is worthy noting that the viscera % in case of OK groups was lower ranging from 18.70 to 16.43% while that of control group was the highest (21.55%).

Table (3): Carcass characteristics for slaughtered rabbits as affected by different levels

Item	Experimental diets				
	0%	25%	50%	75%	100%
Live body weight (LBW), g	1995	2053	1883	2090	1837
Slaughter weight, g	1927	1783	1830	2007	1775
%, of LBW	96.58	86.85	97.17	96.02	96.64
Dressed weight, g	1010	970	913	1050	885
% of LBW	50.55	48.18	48.51	50.32	48.20
Liver weight, g	66.67	75.00	90.00	78.33	66.67
% of LBW	3.36	3.86	4.77	3.74	3.72
Kidney weight, g	23.33[ab]	16.67[b]	25.00[a]	23.33[ab]	20.00[ab]
%, of LBW	1.18	0.84	1.33	1.12	1.09
Heart weight, g	20.00[a]	11.67[b]	15.00[ab]	18.33[ab]	15.00[ab]
% of LBW	1.01	0.57	0.80	0.89	0.82
Head weight, g	133.33[a]	125.00[ab]	120.00[ab]	116.67[ab]	108.33[b]
% of LBW	6.68	6.26	6.38	5.60	5.89
Offal's weight, g	741.7	854.7	720	803.3	741.7
% of LBW	42.35[ab]	38.76[b]	39.08[b]	39.39[b]	44.36[a]
Edible organ weight, g	110.0	103.3	130.0	120.0	101.7
% of LBW	5.54	5.26	6.90	5.75	5.63

a and b: Means in the same row having different super scripts differ significantly (P<0.5).
Offal's included blood, viscera, lungs, skin limbs and tail.
Edible organ included liver, kidney and heart.

Digestibility coefficients and nutritive values:

Significant (P<0.05) differences among treatment groups were observed for the digestibility of OM, CP, EE, and CF only and the vise versa with NFE digestibility as shown in Table (4). Highest value for OM digestibility (69.29%), CP digestibility (80.04%), EE digestibility (77.64%), CF digestibility (46.16%) and NFE digestibility (74.69%) were observed in control group which decreased with inclusion of OK up to 100% of WB. These results are in good agreement with those of Ghazala and El- Shahat (1994) who calculated the digestion coefficients of OK from digestion trials by using barley as basal diet at level of (1:1).

Results of EE digestibility of OK diets were in opposite direction with each composition of OM. Previous other reported that digestion of all digestibility results of the four nutrients (CP, EE, CF and NFE) were reflaxed as a resultant with Organic matter (OM) digestibility. Digestibility of OM was not affected significantly by dietary inclusion of OK up to 75% of WB, however it decreased (P<0.05) in

Table (4): Apparent digestion coefficients and nutritive values (Mean ± SE) of experimental diets

Item	Experimental diets				
	0%	25%	50%	75%	100%
Apparent digestion coefficients					
Dry matter (DM)	$67.37^{a} \pm 1.01$	$65.34^{ab} \pm 1.30$	$64.11^{ab} \pm 1.10$	$62.40^{bc} \pm 1.19$	$59.55^{c} \pm 1.21$
Organic matter (OM)	$69.29^{a} \pm 2.04$	$67.88^{ab} \pm 0.13$	$65.05^{abc} \pm 1.10$	$64.08^{bc} \pm 1.10$	$62.11^{c} \pm 1.28$
Crude protein (CP)	$80.04^{a} \pm 1.98$	$76.99^{ab} \pm 1.13$	$75.37^{b} \pm 0.38$	$73.16^{bc} \pm 0.39$	$70.83^{c} \pm 0.30$
Ether extract (EE)	$77.64^{bc} \pm 1.99$	$76.49^{a} \pm 1.96$	81.35bc ± 1.97	$82.50^{ab} \pm 2.33$	$86.90^{a} \pm 3.44$
Crude fiber (CF)	$46.16^{a} \pm 2.00$	$43.23^{a} \pm 2.12$	$37.32^{ab} \pm 2.12$	$30.00^{ab} \pm 2.81$	$24.84^{b} \pm 10.38$
Nitrogen-free extract (NFE)	$74.69^{a} \pm 7.20$	$64.07^{b} \pm 0.76$	$69.57^{ab} \pm 0.76$	$74.84^{ab} \pm 2.59$	$69.46^{ab} \pm 2.00$
Nutritive values					
Digestible crude protein (DCP)	$13.45^{a} \pm 0.30$	$12.93^{ab} \pm 0.35$	$12.62^{ab} \pm 0.08$	$12.15^{bc} \pm 0.15$	$11.47^{c} \pm 0.05$
Total digestible nutrients (TDN)	$64.85^{a} \pm 3.60$	$60.27^{ab} \pm 1.24$	$59.79^{ab} \pm 1.78$	$58.63^{b} \pm 2.95$	$57.55^{b} \pm 2.14$
Digestible energy (DE), kcal	$2854^{a} \pm 160$	$2673^{ab} \pm 51.83$	$2650^{ab} \pm 69.93$	$2551^{ab} \pm 131.18$	$2543^{b} \pm 114.7$

a,, b and c: Means in the same row having different superscripts differ significantly ($P<0.5$).

the group of rabbits received diet in which OK completely replaced WB. IT is a fact that this may be attributed to higher ash content with higher OK substitution level.

Data concerning the nutritive values (NV) of the experimental diets expressed as DCP, TDN and DE are presented in Table (4). Results of the nutritive values as DCP, TDN and DE were nearly similar by increasing the dietary OK in the rabbit diets up to 75% while there is an adverse effect on these feeding values, by increasing OK level up to 100% of replacing WB.

Economic evaluation:

The cost of 1.0 ton diet was 1685, 1665, 1649, 1622 and 1600 L.E. for diets 1, 2, 3, 4 and 5 respectively as shown in Table (5).

Table (5). Net revenue and economic efficiency

Item	Experimental diets				
	0%	25%	50%	75%	100%
Marketing weight, Kg	2.031	1.920	1.838	1.963	1.916
Feed consumed / rabbit, kg	5.644	5.320	4.950	5.115	5.185
Costing of one kg feed, (LE)[1]	1.685	1.665	1.649	1.622	1.600
Total feed cost, (LE)	9.510	8.858	8.163	8.297	8.296
Management/ Rabbit, (LE)[2]	4	4	4	4	4
Total cost, (LE)[3]	28.51	27.858	27.163	27.297	27.296
Total revenue, (LE)[4]	40.62	38.40	36.76	39.26	38.32
Net revenue	12.11	10.542	9.597	11.963	11.024
Economical efficiency[5]	0.4248	0.3784	0.5333	0.4383	0.4039
Relative economic efficiency[6]	100	89.08	83.17	103.18	95.08
Feed cost / kg LBW (LE)[7]	4.68	4.61	4.44	4.23	4.33

[1] *Based on prices of year 2008.*
[2] *Include medication, vaccines, sanitation and workers.*
[3] *include the feed cost of experimental rabbit which was LE 15/ rabbit + management.*
[4] *Body weight x price of one kg at selling which was LE 20.*
[5] *net revenue per unit of total cost.*
[6] *Assuming that the relative economic efficiency of control diet equal 100.*
[7] *Feed cost/kg LBW = feed intake * price of kg / Live weight.*

It is evident that the control diet was the highest in cost of 1.0 kg diet, while the cost of one kg experimental diets was decreased by increasing the inclusion of OK to replace WB in rabbit diets.

It is evident that the economic efficiency % was the highest with diet 75% OK replaced of WB. Therefore, it is clear that comparing data on the basic of net revenue and economical efficiency show that diet 4 in which OK replaced 75% of WB was the most superior.

CONCLUSION

In Egypt condition of production the use of the available low-cost agriculture by-products (olive cake, olive leaves, wheat bran and other cereal by-products, brewer's grains, straw ...... etc) is necessary to reduce the price of feed that is one of the development of the rabbit raising.

From economic point of view, it appears that the inclusion of OK to replace of WB in rabbit diets is economically effective.

Generally, it could be recommended to use the olive cake meal instead of wheat bran in the growing rabbit diets to get the best relative economic efficiency values without any adverse effects on rabbit performance, digestibility and carcass quality.

REFERENCES

Aboaysha, A.M., Fe. Omar and M.A. Razzaque (1983). Olive oil cake as animal feed. Use of soybean supplemented olive oil cake in the rations of growing Barbary lambs. Libyan J. Agric. 12.

Ahmed, K.I. (1998). Nutritional studies on non- conventional feeds in poultry nutrition in Sinai. Ph.D. Thesis, Fac. of Env. Sci. Suez Canal University, Egypt.

A.O.A.C. (2000). Official Methods of Analysis, 17^{th} ed. Association of Official Analytical Chemists, Arlington, VA, USA.

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

Ghazalah, A.A. and A.A. El-Shahat (1994). Digestibility and acceptability of some agro-industrial by-products by rabbits. Egypt. Poultry Sci., 14: 401.

Kadi, S.A., N. Belaidi-Gater and F. Chebat (2004). Proceeding, 8^{th} World Rabbit Congress. September 7-10, Puebla, Mexico.

NRC. (1977). National Research Council. Nutrient Requirements of Rabbits. National Academy of Science, Washington, D.C.

Razzaque, M.A. and F.E. Omar (1981). Olive oil cake in animal feed. A. Use of olive oil cake in the rations of growing heifers. Libyan J. Agric. 10: 25-30.

Razzaque, M.A., A.M. Aboaysha and F.E. Omar (1980). Olive oil cake as fed for Barbari lambs. Proc. Nut. Soc., 39: 34A.

Rupic, V., J. Skrlin; S. Muzic; V. Serman; N. Stipic and L. Bacar-Huskic (1999). Protein and fats in the serum of rabbits fed different quantities of dried olive cake. ACTA VET. BRNO, 68: 91-98.

SAS (1998). Statistical Analysis System. SAS users Guide. Version 6. 12 Ed. Basics SAS Institute Inc., Cary, NC, USA.

Schiemann, R.K., K. Nehring; L.O. Hofman; W. Jentch and A. chudy (1972). Energyetische Futterbwertung and Energienormen Dueches. Nachdruck. Veb Deursche Landwirtschafts. Berlin.

Snedecor, G.W. and W.G. Cochran (1982). Statistical Methods. 7^{th} ed. Iowa State University Press, Ames, IOWA. USA.

تأثير إحلال كسب الزيتون محل نخالة القمح فى مخاليط اعلاف الأرانب النيوزيلاندى النامية

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(2) قسم الدواجن- كلية الزراعة- الدقى- جامعة الزقلزيق- مصر.

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استخدم فى هذه الدراسة عدد ستون أرنب نيوزيلاندى أبيض مفطومة عمر (4 أسابيع) وزعت على خمسة مجموعات واحتوت كل مجموعة على ثلاثة مكررات داخل كل مكررة أربعة أرانب وتم تسكين كل أرنب فى قفص على انفراد.

استهدفت هذه الدراسة تقييم كسب بذرة الزيتون بالإحلال الجزئى أو الكلى محل مسحوق نخالة القمح فى عليقة الاختبار (العليقة القاعدية). تم دراسة مقاييس النمو وهى وزن الجسم الحى، الزيادة فى الوزن، معدل النمو، استهلاك الغذاء، كفاءة التحويل الغذائى كما أجريت اختبارات الذبح فى نهاية التجربة، وحسبت أيضا الكفاءة الاقتصادية للمنتج النهائى كما تم أيضا التقييم الغذائى للعلائق المختلفة من حيث التركيب الكيماوى ومعاملات الهضم ، وأخيرا القيمة الغذائية لمخاليط الأعلاف التجريبية. أظهرت نتائج هذا البحث الخاصة بأداء الأرانب خلال فترة النمو مدعمة بمواصفات الذبيحة ما يلى:

انخفض استهلاك الأرانب المغذاه على المستويات المختلفة من كسب بذرة الزيتون بحوالى 6.6 – 13.6% أقل عن تلك الأرانب المغذاه على عليقة المقارنة. أوضحت النتائج الخاصة بالزيادة المكتسبة فى وزن الأرانب والناتجة من وحدة المركبات الغذائية المهضومة (TDN) أفضلية استبدال نخالة القمح بكسب بذرة الزيتون بمعدل 75%. حققت النسبة المنوية لتصافى الذبيحة بدون الراس أعلى نسبة فى مجموعة أرانب المقارنة (50.55%) بينما تراوحت هذه النسبة من 48.18- 50.3% للعلائق المحتوية على كسب بذرة الزيتون. تشير النتائج المختلفة لهذه التجربة من الوجهة الغذائية إلى إمكانية إحلال كسب بذرة الزيتون لعلائق الأرانب النامية كإحلال كامل لنخالة القمح بدون تأثيرات سلبية على أدائها. كما تشير اقتصاديات البحث إلى أن إمكانية إحلال مسحوق كسب بذرة الزيتون بمعدل 25-100% من نخالة القمح فى علائق الأرانب المختبرة كان ذا تأثير اقتصادى. لوحظ وجود فروق معنوية بين مخاليط أعلاف المعاملات التجريبية لقيم كل من المادة الجافة ، والمادة العضوية، والألياف الخام بينما كانت هذه الفروق مرتفعة جدا فى معاملات الهضم لكل من البروتين والدهن والكربوهيدرات الذائبة. لوحظ وجود اختلافات معنوية عند مستوى المعنوية (0.05) بين مخاليط أعلاف المجموعات التجريبية لمعاملات هضم كل من المادة العضوية والبروتين الخام والدهن الخام والألياف الخام والعكس بالعكس بالنسبة لمعاملات هضم الكربوهيدرات الذائبة. كانت القيم الغذائية وهى (البروتين المهضوم و المركبات الغذائية المهضومة الكلية والطاقة المهضومة متشابهة تماما مع زيادة مستوى كسب الزيتون الغذائى فى علائق الأرانب حتى 75% بينما لوحظ وجود تأثير على هذه القيم الغذائية برفع مستوى الإحلال إلى 100%.

مما تقدم تنصح الدراسة باحلال كسب بذرة الزيتون كمخلف عن صناعة عصر الزيتون حتى مستوى75% من نخالة القمح فى علائق الأرانب النامية.