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IMROVING NUTRITIVE VALUE OF OLIVE TREES BY-PRODUCTS BY BIOLOGICAL AND CHEMICAL TREATMENTSAND ITS EFFECT ON SHEEP PERFORMANCE

A. A. Mahrous[1]; A. S. Karkoutli[2]; A. A. H. El-Tahan[1]; Y. H. Hafez[1]; M. A. El-Shora[1] and S. K. Moussa[2]

[1]Animal Production Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

[2] The Arab Center for the Studies of Arid Zones and Dry Lands, ACSAD, Damascus, Syria.

SUMMARY

This experiment was conducted to study the effect of biological and chemical treatments of olive trees by-products on chemical composition, degradability, cell wall constituents, digestibility and nutritive value and its feeding effect on productive performance of growing sheep. Eighteen (½ Finnish Landrace × ½ Rahmani) lambs with average body weight 18.00±0.40 kg and 4 months old were used in this study for 120 days. Lambs were distributed into three similar groups (6 lambs each) and randomly assigned to three experimental rations. The three respective rations composed of concentrate feed mixture (CFM) + olive trees by-products, the control ration (R1) contained untreated olive tree by-products; (R2) treated olive trees by-products with EM1 and (R3) treated olive trees by-products *with* El-mofeed. The digestibility and nutritive values of experimental rations were determined using nine adult Ossimi rams. Rumen liquor and blood samples were collected at the end of collection period. The results showed that nutrient digestibility and feeding values (TDN and DCP) were higher ($P<0.05$) for rations containing treated olive trees by-products than control. The highest values of TDN and DCP were observed for R2. Digestibility of cell wall constituents (NDF, ADF, cellulose and hemicellulose) were improved by treatments. Concentrations of rumen parameters (NH_3-N and TVFA's) were significantly ($P<0.05$) increased by treatments. However, no significant ($P>0.05$) differences were found in blood constituents (total protein, albumin, globulin, GOT, GPT and urea) among the different experimental groups. Blood sereum constituents were generally normal in all experimental groups. Growth performance with respect to total body weight gain and average daily gain (ADG) were improved by biological and chemical treatments. The same trend was observed for feed conversion and economic efficiency and the best values were recoded with R2. It was concluded that inclusion of biologically treated olive trees by-products to rations of growing (½ Finnish Landrace × ½ Rahmani) lambs could improve their performance especially treatment of olive trees by-products.

***Keywords**: olive trees by-products, biological treatments chemical treatments, digestibility, blood and rumen parameters, sheep and growth.*

INTRODUCTION

The feed cost represents more than 70% of the total animal production cost. It is now urgent to look for alternative feed stuff to compensate the high cost of the conventional feedstuff. The gap between the availability and requirements of animal feed in Egypt is about 9 million tons of dry matter equivalents to almost 4 million tons of total digestible nutrients (TDN) per year (Bendary *et al.*, 2006), therefore efforts allowed some by products and organic wastes with the aim of decreasing the animals feed shortage. In Egypt, there are about 119,000 Fadden planted with olive trees, produce about 314,450 tons of olive (Ministry of Agriculture, 2012), basically, one tone of olive produce approximately 350 kg of crude olive cake. Olive cake is usually described as low quality feedstuff because of their low nutritive value, high content of fiber (Molina-Alcaide and Nefzaoui, 1996 and Abbeddou *et al.*, 2011) and low degradability of cell wall component (Teimouri Yansari *et al.*, 2007) and low content of protein and energy (Al-Masri and Guenther, 1995). In Sinai where livestock depend mainly upon grazing of natural pastures animals suffer from a shortage of feed during most of the year. In such areas, the possibility of using the agro-industrial by-products as a part of concentrate mixture, in addition to the native range forages is of more than passing interest. Large area are cultivated by olive trees, especially in Sinai and North-western coast zone, therefore, there are great amounts of olive by-products without beneficial usage and are considered as wastes. It has been estimated that each olive tree product 22 kg leaves and twigs per year and 25 kg olive cake per 100 kg olive fruits (Nefzaoui, 1983) that using olive trees by-products as animal feed could participate in solving the problems of feed shortage which is particularly realized at drought seasons and hence the selling price of animals products. Most of by-products are poor in nutrients such as protein and vitamins and they are rich in fibers with low digestibility. Therefore, there are many methods for improving the nutritive value of these by-products like as physical, chemical, physic-chemical and biological treatments. Biological treatment is used for increasing the nutritional value of many by-products, because they have significant concentrations of simple carbohydrates, such as mono-and disaccharides. For these reasons the microbial conversion of these wastes can improve their nutritional value and transforming them into animal feed with high quality (Villas-Boas *et al.*, 2002). Akinfemi and Ladipo (2013) showed that fungal treatment of sawdust enhances its nutrient contents and *in vitro* digestibility. Fungi treatment of cotton stalks increased protein content, protein digestibility, fiber fractions digestibility and hence improved the overall feeding values. (Deraz and Ismail, 2001). The aim of this study is to find out the influence of chemical or biologically treatments of wastes produced from olive trees on their nutrients digestibility, feeding value, rumen fermentation, sheep performance and their feed economic efficiency of sheep.

MATERIALS AND METHODS

The experimental work of this study was carried out at Sakha Experimental Station, Animal Production Research Institute, Agriculture Research Center. Eighteen crossbred ram lambs (½ Finnish Landrace × ½ Rahmani) after weaning at four months of age with an average live body weight 18±0.4 kg were assigned to three groups according to live body weight (6 lambs for each). They were assigned at random to the three experimental diets. Animals in all groups were fed rations consisting of concentrate feed mixture (CFM) to cover their requirements according to NRC (1985) recommendations while, olive trees by-products were offered *ad lib*. The animals were fed the three respective rations in two meals /day (8 a.m and 3 p.m).

Each group was randomly fed one of the following experimental treatments: R1 (control): concentrated feed mixture (CFM) + olive tree by-products; R2: CFM + olive tree by-products treated with EM_1. and R3: CFM + + olive tree by-products treated with El-mofeed (91% molasses; 2.5% urea and 6.5% mixing minerals and vitamins). The EM_1 is a product of EMRO Organization in Japan (EM1) Research Organization, Inc., Takamiyagi Bldg. 2F, 2-9-2 Gameko, Ginowan-shi Okinawa, Japan).. It was sprayed on fresh olive tree by-products at 60% (v/w) in an airtight container (anaerobic condition). Olive tree by-products was chopped into 3-5 cm then packed till using. 50 g of residue under investigation were weighted, packed in heat resistant bags (10 x 20 cm) and sterilized by autoclaving for 121 ^oC for 30 minutes. The treated olive tree by-product was moistened at 65 – 70% and put specific fungal spawn and left for three weeks. The untreated and treated olive tree by-products were analyzed for DM, CP, EE and ash content according to A.O.A.C. (1995). The nitrogen free extract (NFE) was calculated by subtracting the summation percentages of CP, CF, EE and Ash contents from one hundred. Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) were determined by the methods of Van Soest *et al.* (1991). A digestibility trial was conducted using nine adult Ossimi rams and divided into three similar groups (3 animals for each) averaged (55 ± 2.00kg, a live body weight) and 3 years old. Animals were housed in individual metabolic cages for 21 days (14 days as a preliminary period followed by 7 days as collection period) to determine the digestibility coefficients and nutritive values of the three respictive tested rations. All groups were fed olive trees by-products untreated or treated *ad. Lib*. Feces were collected quantitatively every day and 10% daily sample was taken and sprayed with 10% sulfuric acid and dried during the collection period. At the end of the collection period, feces samples for each ram were ground mixed well and kept in the refrigerator for chemical analysis. Rumen liquor samples were taken from each animal at the end of collection period by stomach tube at 0 and 4 hrs. post-feeding. The Ruminal pH values were measured immediately by pH meter (Orion Research, model 201/digital pH meter). Ammonia nitrogen (NH_3-N) concentration was measured according to Conway and O'Mally (1957). Total VFA's concentration was determined by the steam distillation method according to Abou-Akkada and Osman (1967). Total fungal counts were determined according to (Difco, 1984) and microbial protein was measured by sodium tangistate methods according to Shultz and Shultz (1970). Feed and fecal samples were chemically analyzed according to the methods of A.O.A.C (1995). Blood samples were taken at the end of the experimental period. Blood samples were taken from the Jugular vein of three animals in each group at 8.00 am into vacationer tubes, and then allow the coagulated blood samples were centrifuged at 3000 rpm for 20 min to obtain blood serum. The supernatant was frozen and stored at -20 oC for subsequent analysis. Blood ser4um analyzed for total protein (Armstrong and Carr 1964), albumin (Doumas *et al*., 1971), globulin (calculated by subtracting concentration of serum albumin from the corresponding concentration of total protein), creatinine (Folin, 1994), urea (Siest *et al*., 1981), cholesterol (Fassati and Prenciple, 1982), triglycerides (Richmond, 1973) as well as activity of asprtate (AST) and (ALT) aminotransaminases (Reitman and Frankel, 1957) and total antioxidant capacity (Sies, 1997) using commercial kits by calorimetric determination.

Collected data of nutrients digestibilities, rumen fermentation and blood biochemical parameters were subjected to statistical analysis using one-way-analysis of variance according to Snedecor and Cochran (1980) uses the following mathematical model:

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

Where: Y_{ij} is the parameter under analysis, μ is the overall mean, T_i is the effect due to treatment and e_{ij} is the experimental error. The general linear model of SAS (2004) program was used in processing measured parameters. The difference between means was statistically measured for significance at ($P<0.05$) according to Duncan's test (1955).

RESULTS AND DUSCUSSION

Chemical composition:

Table (1) shows the effect of biological and chemical treatments on chemical composition and cell wall constituents of olive tree by-product. The present data indicated that the values of DM, OM, CF and NFE were decreased in treated olive tree by-product. However, CP was increased from 3.34% for untreated olive trees by-products to 7.32 and 5.80% for treated with EM1 and El-mofeed treated, respectively. Results are in agreement with those obtained by Mahrous *et al*. (2011&2012) and El-Ashry *et al*. (2003) who reported that in fungal treated residues (sugarcane bagasse, wheat straw, cotton stalks, pinnae and mid ripe of date palms), CP and ash contents were increased but DM, OM, CF and NFE contents were decreased. Also, Fayed *et al*. (2009) reported that urea or fungal treatment of olive leaves led to decrease CF content; meanwhile, CP and ash contents were increased in comparison with those for untreated olive leaves.

Table (1): Chemical composition (% on DM basis) of untreated and treated olive tree by-product and concentrate feed mixture (CFM).

Item	Treatment			
	T1	T2	T3	CFM*
DM	91.56	87.60	89.30	88.7
OM	90.64	85.38	90.60	92.82
CP	3.34	7.32	5.80	14.16
CF	53.53	46.32	48.37	11.05
EE	0.67	1.18	1.10	2.3
NFE	33.10	30.56	30.53	65.31
Ash	9.30	14.62	9.40	7.18
NDF	81.65	74.20	77.32	27.79
ADF	67.72	59.31	61.22	8.86
ADL	37.84	26.05	28.30	2.89
Cellulose	29.88	33.26	32.92	5.88
Hemicellulose	13.93	14.89	16.10	18.89

** Concentrate feed mixture (CFM) consisted of: 38% ground yellow corn, 22% undecorticated cotton seed meal, 7% soybean meal, 12% wheat bran, 13% rice bran, 5% cane molasses, 2% lime stone and 1% common salt.*

T1: un-treated olive tree by-products; T2: olive tree by-products treated with EM1 and T3: olive tree by-product treated with El-mofeed.

Digestibility coefficients and nutritive values:

Nutrients digestibility and nutritive values of un-treated and treated rations are presented in Table (2). Data of digestibility trials showed that biological and chemical treatments had a significantly (P<0.05) increased digestibility of DM, OM, CP, CF, EE, NFE, NDF, ADF, ADL, cellulose and hemicellulose with others of un-treated ration These results are in agreement with those obtained by Abdel-Malik *et al.* (2003) who reported that the digestibility coefficients of DM, OM, CP, CF, NFE, NDF, ADF, ADL, hemicellulose and cellulose were increased (P<0.05) for banana by-product treated with both chemical (urea or urea plus acid) and biological treatment (bacteria, fungi or bacteria plus fungi) in comparison with others for the untreated one. Moreover, Hassan *et al*. (2005) reported that the average digestibility coefficients of CP, NDF and cellulose were higher (P<0.05) in treated banana wastes compared with control. Fayed *et al*. (2009) found that the DM, OM, CP, and CF digestibilities of urea or biological treated olive trees by-product were higher than untreated. Also, El-Shafie *et al*.(2007) reported that the biological treatment (*T. viride*) of wheat straw improved the digestibility coefficients of DM, OM, CP, CF, EE, NDF, ADF, ADL, cellulose and hemicellulose compared with control. The nutritive values as TDN and DCP were significantly (P<0.05) higher for sheep fed rations contained treated (EM1 and El-mofeed) than fed control ration (untreated). Deraz and Ismail (2001) reported that biological treatment of cotton stalks could increase their feeding values as TDN and DCP compared with untreated cotton stalk. Fayed *et al*. (2012) found that using potato vines treated with *T. reesei* in sheep ration significantly increased TDN and DCP. These improvements are associated with increasing the digestion in fibrous materials particularly hemicellulose in addition to the increased bacterial digestion of cell wall content (Hassan et al., 2005). Ahlam (2017) reported that the inclusion of allzyme SSF in the diets significantly (P<0.01) improved the digestibility in comparison with the control diet (untreated olive cake Untreated). Sheep fed Olive cake + 1.0 % Allzyme SSF and olive cake + 1.5 % Allzyme SSF diets tended to digest better with more efficiently than those fed the control diet and Olive cake + 0.5 % Allzyme SSF with low level of Allzyme SSF (0.5%).

Table (2): Effect of treatments on digestibility coefficients and nutritive values.

Item	Experimental ration			±SE
	R1	R2	R3	
Digestibility coefficients%:				
DM	55.32^{b}	62.07^{a}	61.38^{a}	0.20
OM	55.73^{b}	62.53^{a}	61.67^{a}	0.33
CP	56.54^{b}	64.60^{a}	62.14^{a}	0.65
CF	48.42^{b}	53.47^{a}	52.96^{a}	0.44
EE	74.40	77.04	75.40	0.55
NFE	59.88^{b}	65.40^{a}	63.60^{a}	0.04
Cell wall constituents %:				
NDF	59.88^{b}	65.40^{a}	63.60^{a}	0.34
ADF	42.33^{b}	56.43^{a}	55.50^{a}	0.05
ADL	33.62^{b}	39.82^{a}	40.85^{a}	0.90
Cellulose	21.48	20.95	17.92	0.66
Hemicellulose	48.83^{b}	59.89^{a}	58.32^{a}	
Nutritive value %:				
TDN	54.06^{b}	59.69^{a}	58.52^{a}	0.78
DCP	5.73^{b}	7.42^{a}	7.05^{a}	0.04

[a] and [b] Means in the same row with different superscript are significantly (P<0.05).

Rumen parameters:

Ruminal pH values recorded for sheep fed untreated or treated olive tree by-products are shown in Table (3). Sheep fed untreated olive tree by-products (control) showed significantly higher (P<0.05) ruminal pH values at 0 and 4 hrs. post-feeding than those fed biological and chemical treated groups (R2 and R3). These results in agreement with Deraz and Ismail (2001) reported that animal fed fungal treatment showed lower (P<0.05) rumen pH value compared with those fed control ration that may related to the more utilization of the diet energy and positive fermentation in the rumen. However, Kholif *et al*. (2005) and Mahrous *et al*. (2011) reported that biological treatments (fungi or enzyme) did not affected ruminal pH values. Also, Mahrous and Khorshed (2012) reported that the differences of ruminal pH values were not significantly (P>0.05) among groups fed rice straw treated with *T. reesei*, *Pencellium funiculusms (P. funiculusms)* or *T. reesei +P. funiculusms.* Aziz *et al.* (2008) indicated that biological treatment of olive pruning tree by-products with *Phanerochate chrysosporium (P ch) + S. cervesiae (S C)*; *T. viride + SC*; and *P ch + T. viride + SC* had the highest ruminal pH values compared with untreated rise straw.

Table (3): Rumen liquor parameters for animals fed the experimental rations.

Item	Experimental ration				±SE
	Time (hrs.)	R1	R2	R3	
pH	0	6.55[c]	6.77[a]	6.62[b]	0.02
	4	6.50[a]	6.17[c]	6.24[b]	0.03
NH_3-N (mg/100ml)	0	19.05[a]	17.28[c]	18.51[b]	0.08
	4	20.95[c]	28.01[a]	24.39[b]	1.20
TVFA's (meq./100ml)	0	9.8[c]	13.21[a]	12.30[b]	1.35
	4	12.6[c]	17.60[a]	14.78[b]	0.84

[a, b,] and [c] Means within the same row with different superscripts differ (P<0.05).

Ahlam (2017) reported showed lower (P<0.05) rumen pH value compared with those fed control ration the control diet (untreated olive cake) compared with sheep fed olive cake + 1.0 % Allzyme SSF and olive cake + 1.5 % Allzyme SSF diets and olive cake + 0.5 % Allzyme SSF with low level of Allzyme SSF (0.5%). Rumen pH is one of the most important factors affecting fermentation in rumen and influences its functions. Findings also have been reported in buffalo calves (Sabbah *et al*., 2013). Molina-Alcaide and Nefaoui (1996) indicated that feeding olive cake o sheep resulted in favorable pH of fibrolytic activity (pH from 6.6 to 7.2). The present data revealed that the highest values of ruminal ammonia nitrogen were observed with sheep fed olive tree by-products (R2) followed by R3 and R1 at 0 and 4 hrs. post-feeding. These differences of ruminal ammonia nitrogen values may be due to the differences in nitrogen sources between treatments (Bassuny *et al*., 2003a). Similar trend obtained by Mahrous and Khorshed (2012) with rice straw; Bassuny *et al.* (2003b) with sugarcane bagasse. They reported that the ruminal ammonia nitrogen by rams fed urea or fungal treated roughage significantly increased (P<0.05) compared to untreated roughages. Also, Khorshed (2000) found a significant increase in rumen ammonia nitrogen with fungal treated residues and with yeast culture treatment. On the other hand, Hassan *et al.* (2005) reported that ruminal ammonia nitrogen was significantly increased (P<0.05) for untreated banana wastes than that of biologically treated group. The increase in ammonia nitrogen concentration with post-feeding may be related to degradation of dietary degradable or may be due to NPN content of urea treatment which is converted easily to ammonia during the fermentation. Philip *et al.* (2014) reported that the highest values of ruminal ammonia nitrogen were observed with sheep fed pruning grape trees by-products treated with fungi followed by treated with urea at 3hrs. post-feeding. These differences of ruminal ammonia nitrogen values may be due to the differences in nitrogen sources between treatments. R2 and R3 significantly increased (P<0.05) the concentration of TVFA's. These results are in agreement with those obtained by Mahrous *et al*. (2012), Bassuny *et al*. (2003b), El-Sayed *et al*. (2002) and Abd El-Gawad *et al*. (1993); Philip *et al.,* (2014) and Ahlam (2017). They reported that rumen TVFA's concentrations were significantly increased with biological and chemical treatments.

Total fungal counts and microbial protein:

As shown in Table (4), R2 and R3 were found to achieve (P<0.05) higher total fugal count compared with R1. Data showed significance increase (P<0.05) of microbial protein in favor of groups fed olive tree by-products treated being (0.64 and, 0.54 ($x10^3$ cfu/ml) for R2, and R3, respectively, compared with the control ($0.49x10^3$ cfu/m1). The microorganisms used most of the fermentable sugars from the protein for protein synthesis. Whereas the white rot fungi-exhibited promising ability for the decomposition of lignin-cellulose containing materials and for increasing the availability of carbohydrates and production of fungal protein Iconomou *et al.*, (1997) and Philip *et al.*, (2014).

Blood serum parameters:

The data of Table (5) showed insignificant (P>0.05) differences among the different experimental rations for blood serum total protein, albumin, globulin, AST and ALT except total antioxidants capacity and triglycerides . These results were in agreement with that obtained by Aziz *et al.* (2008) who reported that urea treatment had the higher value (P<0.05) of blood urea. Mousa (2003) showed that urea treatments increased serum total protein, albumin and globulin in growing lambs. Mahrous *et al*. (2011) and Deraz and Ismail (2001) reported that no significant differences (P<0.05) were observed in blood constituents as feeding rations contained biologically treated roughage.

Table (4): Total fungal counts and microbial protein for animals fed the experimental rations.

Item	Experimental ration			±SE
	R1	R2	R3	
Total fungus Counts ($x10^3$cfu/ml)	1.52^c	1.86^a	1.60^b	0.40
Microbial protein (g/100ml)	0.49^c	0.64^a	0.54^b	0. 20

[a, b] and [c] Means within the same row with different superscripts differ(P<0.05).

Table (5): Effect of biological and chemical treatments on blood serum parameters for lambs.

Item	Experimental ration			±SE
	R1	R2	R3	
Total protein (g/dl)	6.43	6.55	6.60	0.35
Albumin (g/dl)	3.69	3.79	4.01	0.19
Globulin (g/dl)	2.74	2.76	2.59	0.26
Creatinine (mg/dl)	1.25	1.23	1.22	0.11
Urea (mg/dl)	43.82	42.15	43.61	3.48
ALT (U/ml)	20.50	21.25	19.25	2.61
AST (U/ml)	31.25	43	39	3.67
Total antioxidants capacity (mmol/l)	0.78^b	0.98^a	0.82^b	0.04
Cholesterol (mg/dl)	148.50	151	148	4.40
Triglycerides (mg/dl)	126.75^a	112.50^{ab}	104.50^b	6.28

[a] and [b] Means within the same row with different superscripts differ (P<0.05).

It is well to recognize that insignificant (P>0.05) differences either among the different experimental groups for blood plasma AST and ALT activity. The present values of AST and ALT which are indicators of kidney and liver functions and normal activity of the animal hepatic tissues. Consequently, biological treatments applied in the present investigation had no an adverse effect on the liver function. These results indicate that inclusion of treated olive trees by-products in sheep rations hadn't any adverse effect on animal health, which the presented estimates are being within the normal range reported by Merck (1991) and showed a healthy condition of the experimental animals. Group fed R2 had (P<0.05) higher concentration of the blood serum antioxidant capacity (mmol/l) compared with R3 and R1. This result could be attributed to higher EM1 supplementation as bacterial source of peroxidase in group fed R2. Peroxidase is the most important enzymatic mechanisms which protect an organism against oxidative stress which safely interact with free radicals as an antioxidant. (Kleczkowski *et al*., 2004).

Growth performance and economic efficiency:

The average values of feed intake, daily gain, feed conversion and economic efficiency are shown in Table (6). Data revealed that total body gain and daily gain, were significantly (P<0.05) high for lambs fed ration containing either biologically or chemically (El-mofeed) treated olive tree by-products compared with control. The highest value of DMI was observed in R3 followed by R2 (EM1). These findings are in agreement with that obtained by Abdel-Azim *et al.* (2011) who reported that DMI for lambs fed ration containing treated roughage (rice straw or corn stalks) with *T. viride* were higher than control ration (untreighated). Also, Mahrous (2005) showed that DMI was higher for lambs fed corn stalks treated fungus *(Cheatomium cellublyticum, CC+ T. viride*) followed by that supplemented with *T. viride* than those fed cotton stalks treated with CC then the least one for control (untreated). Feed conversion as kg DMI/ kg gain

6.13, 7.01 and 8.08 for R2, R3 and R1, respectively. The best feed conversion was that for lambs fed R2.The improvement of feed conversion may be due to improvement in both nutrient digestibilities and nutritive value. Similar trend was obtained by Mahrous *et al.* (2005) reported that groups fed ration containing treated wheat straw (*T. viride + T. reesei*) or cotton stalks treated with *T. viride* or *Cheatomium cellublticum* (CC) or treated with both fungi revealed better ($P<0.05$) in feed conversion as DM. Also, El-Marakby (2003) indicated that groups fed biologically treated roughage (cotton stalks or wheat straw) were the most efficient group in feed conversion.

Results in Table (6) revealed also that feed cost, LE/kg and relative feed cost, % were decreased as biological and chemical treatments in tested ration (R2 and R3) compared to control ration (R1). However, the daily profit, LE and relative daily profit% were increased by feeding rations containing olive tree by-products treated either with EM1 and El-mofeed. Similar trend was observed by El-Shafie *et al.* (2007) who showed that the lowest cost of feed/ kg weight gain and economic efficiency was observed with lambs fed ration contained high level of biologically treated wheat straw with *T. viride*. Also, Abd El-Azim (2011) noticed that the lowest feed cost recorded with animal fed treated roughages. Fayed *et al.*(2009) found that feeding sheep on ration containing olive trees pruning by products treated chemically with urea or biologically improved animal performance, increased digestibility of all nutrients, increased nutritive value, improved rumen liquor and blood parameters, decreased feed cost.

Table (6): Effect of experimental rations on growth performance of lambs.

Item	Experimental ration		
	R1	R2	R3
Initial live body weight (I.B.W), Kg	18.2	18.4	18.4
Final live body weight (F.B.W), Kg	34.1	39.4	35.8
Total body gain, Kg	14.6	21.2	18.2
Daily gain, g	140	168	151
Feed intake/day (DMI), g:			
CFM	792	863	995
Olive trees by-products	186	216	240
Total DM, g	978	1079	1235
Feed conversion (DMI Kg/Kg gain)	8.08	6.13	7.01
Economic Efficiency			
Price of daily gain, LE	7.26	10.56	9.06
Daily feed cost, LE:			
CFM	3.36	3.88	4.10
Olive trees by-products	0.11	0.14	0.12
Total daily feed cost, LE	3.47	4.02	4.22
Feed cost/kg gain, LE	47.79	38.06	46.57
Daily profit, LE	8.4	10.08	9.06
Economic feed efficiency,%*	242.0	250.7	214.7
Relative feed cost, %**	100	79.64	97.44
Relative daily profit, %***	100	120.00	107.85

Price of 1 ton CFM= 4500 LE Price of 1 ton un-treated olive tree by-products = 600 LE. Price of 1 ton treated olive tree by-products with EM1 = 700 LE. and Price of 1 ton treated olive tree by-products with El-mofeed = 700 Market price of 1 kg live body weight in (2019) = 60 LE.

** Economic feed efficiency% = daily profit/daily feed cost X 100*

***Relative feed cost, %=Feed cost, LE/kg gain (R2 and R3)/R1*

****Relative daily profit, % =Daily profit LE (R2and R3)/R1.*

CONCLUSION

It could be concluded that incorporation of biological and chemical treatment of olive trees by-products in lambs rations improves digestibility, nutritive value and increasing the performance of growing lambs meanwhile, solving the problem of environmental pollution and treatment with EM1 (R2) showed the best results.

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القيمة الغذائية لمخلفات تقليم اشجار الزيتون بالمعاملات البيولوجية والكيمائية وتاثير ذلك على اداء الأغنام

احمد عبد الرحمن محروس[1] وايمن سعيد كركوتلى[2] و علاء الدين احمد حسن الطحان[1] و يوسف حسين حافظ[1]

و محمد الشورى [1] و صاموئيل كبرئيل موسى[2]

[1] معهد بحوث الانتاج الحيوانى- مركز البحوث الزراعية - الدقى – الجيزة- مصر.

[2] المركز العربى لدراسات المناطق الجافة والاراضى القاحلة – اكساد – دمشق – سوريا.

اجريت هذة الدراسة لتقييم تاثير المعاملة البيولوجية او الكيماوية لمخلفات تقليم اشجار الزيتون على الاداء الانتاجي للحملان الاوسيمى حيث استخدم 18 حمل بمتوسط وزن 18 ±0.2 كجم عمرها 4 اشهر تم توزيعها عشوائيا الى ثلاثة مجاميع (6حملان /مجموعة). غذيت الاغنام لـ مدة 120يوم على عليقة مكونة من علف مركز ومخلف تقليم اشجار الزيتون وكانت العلائق على النحو التالى:

المجموعة الاولى: مخلوط علف مركز + مخلفات تقليم اشجار الزيتون غير معامل (مجموعة المقارنة) للشبع.

المجموعة الثانية: مخلوط علف مركز + مخلفات تقليم اشجار الزيتون المعامل بمحلول EM1 للشبع.

المجموعة الثالثة: مخلوط علف مركز + مخلفات تقليم اشجار االزيتون المعامل بالسائل المغذى المفيد للشبع

اشارت النتائج الى زيادة معدل اختفاء كل من المادة الجافة والعضوية والبروتين الخام للمخلفات المعاملة سواء بمحلول EM1 او بالسائل المغذى واستخدم 9 كباش تامة النمو (3 فى كل مجموعة) لتقدير معاملات الهضم والقيمة الغذائية فى صورة مركبات كلية مهضومة وبروتين خام مهضوم وقد اشارت النتائج الى تحسن قيم كل من معاملات الهضم والمركبات الكلية المهضومة للعلا ئق المحتوية على مخلفات تقليم اشجار االزيتون سواء المعاملة ب EM1 او السائل المغذى المفيد وقد سجلت المعاملة الثانية اعلى القيم. (59.69% مركبات كلية مهضومة؛ 7.42% بروتين خام مهضوم) وبصفة عامة فان المعاملات ادت الى زيادة معاملات هضم مكونات الالياف. كما اشارت قياسات الكرش الى زيادة تركيز الامونيا والاحماض الدهنية الطيارة الكلية نتيجة التغذية على مخلفات تقليم اشجار الزيتون المعاملة بينما لم تتاثر مكونات الدم. ادت المعاملات الى زيادة معدل النمو اليومى وكذلك تحسن كفاءة التحويل الغذائى مما ادى الى تقليل تكلفة انتاج كجم نمو وكانت افضل النتائج مع المجموعة الثانية.

يستنتج من هذه الدراسة انة يمكن استخدام مخلفات تقليم اشجار الزيتون المعاملة سواء بمحلول EM1 او السائل المغذى المفيد فى علائق الاغنام الاوسيمى حيث ادت المعاملات الى تحسن معاملات الهضم والقيمة الغذائية هذا بالاضافة الى تحسن معدل النمو اليومى وكفاءة تحويل الغذاء والكفاءة الاقتصادية وكانت افضل النتائج مع استخدام مخلفات تقليم اشجار الزيتون المعاملة بيولوجيا ب EM1.