USING OF BIOLOGICAL AND CHEMICAL TREATED OLIVE TREES BY-PRODUCTS TREATED FOR LACTATING DAMASCUS GOATS FEEDING. 30

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 study was conducted to evaluate changes in productive performance, in terms of milk yield and its composition, of lactating Damascus goats, resulted of feeding three 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 (product of EMRO Organization in Japan) and (R3) treated olive trees by-products with El-mofeed. Eighteen lactating Damascus goats (within three seasons of lactation) aged 24 - 30 months, weighed 37.20±0.2 kg and were in 2nd - 3rd season of lactation were distributed according to their live body weight and milk production into three similar groups, (6 goats each). The experiment lasted for 120 days after the does weaned their offspring. Milk yield was significantly ($P<0.05$) higher with groups treated olive trees by-products with EM1 and El-mofeed than untreated ones. Averages of DM, TDN and DCP intakes were the highest with R2, compared with the other tested rations. Feed conversion value expressed as (kg TDN/ kg milk) was practically similar for both R2 and R3 rations being lower than that of the R1 rations. The feed conversion values expressed as (g DCP/ kg milk) recorded the best values being 76.03, 83.95 and 96.98 g/kg milk for R2, R3 and R1, respectively. The results of blood serum parameters showed insignificantly ($P>0.05$) values of total protein, albumin and globulin, cholesterol, triglyceride, total antioxidant capacity and urea concentrations. It could be concluded that biological treatments (EM1) and chemical treatments (El-mofeed) to rations of lactating Damascus goats improved milk yield, milk composition and feed conversion.

***Keywords**: olive trees by-product, lactating Damascus goats, biological treatments, chemical treatments, milk production, milk composition.*

INTRODUCTION

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), low degradability of cell wall component (Teimouri Yansari *et al*., 2007) and low content of protein and energy (Al-Masri and Guenther, 1995). Both olive tree culture and olive oil industry produce large amounts of by-products. It has been estimated that pruning produces 25kg of by-products (twigs and leaves) per tree per year. Leaves represent 5% of the weight of olives in oil extraction. On the other hand, the olive oil industry produces 35kg of solid waste (crude olive cake) and 100L of liquid waste (oil mill wastewaters) per 100kg of treated olives. Such substantial amounts of by-products may have harmful effects on the environment. Consequently, much alternative utilization of by-products has been considered. One important alternative from the quantitative point of view is their utilization as a source of nutrients for animals (Molina-Alcaide and Nefzaoui, 1996). The great developing in grape vine farms in Egypt, especially in reclamation zones has led to the huge accumulation of tree pruning by products. The major method of disposal of wastes produced from pruning shrubs in general is burning them and, this unacceptable due to high percentage of CO_2 produced which when released into atmosphere contributes to global warming. The global concern for reduction in activities

that leads to depletion of ozone layer has long being discouraged. Apart from pollution caused by burning, it possesses threat to livestock, humans and a distortion in the ecological balance. At the same time, there is an increasing global demand for energy and food, and a growing shortage of natural resources (Croan, 2000). Grapevines (*Vitis vinifera* L.) are grown all over the world's moderate climate belts (isotherms around10-20°C), i.e., between 30°C and 50°C produce considerable quantities of by-products. The present study was conducted to investigate the effect of EM1 and El-mofeed treatments of olive trees by-products in lactating Damascus goats rations on digestibility, milk yield and composition and body weight.

MATERIALS AND METHODS

The experimental work of this study was carried out at Sakha Experimental Station, Animal Production Research Institute, Agriculture Research Center. Eighteen lactating Damascus goats (within three seasons of lactation) aged 24 - 30 months, weighed 37.20±0.2 kg and were in 2^{nd} - 3^{rd} season of lactation were selected from Shkah Station herd. The selected goats were distributed according to their live body weight and milk production into three equal groups (6 goats each). The animals of each group were kept in a separate shaded pen. The experiment lasted for 120 days after weaning offspring. The animals were fed for two weeks as a transitional period on the same experimental rations before the start of collecting results of the experimental work. 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 (1981) recommendations while, olive trees by-products were offered *ad lib*. The animals were fed the three respective rations in two meals /day (8 am and 3 pm). 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 EM_1. and R3: CFM + olive tree by-products treated 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 (EM_1 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 ^{o}C 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 the treated olive tree by-products were analyzed for (DM), crude protein (CP), ether extract (EE), crude fiber (CF) and ash content according to the 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). Blood samples were collected from the jugular vein at 3 hrs. post-feeding and centrifuged for 20 min at 3000 r.p.m. The supernatant was frozen and stored at -20^{o}C for subsequent analysis. Serum total protein was determined according to Armstrong and Carr (1964); albumin according to Doumas *et al.*, (1971); Globulin calculated by subtracting concentration of serum albumin from the corresponding concentration of total protein; AST and ALT according to Reitman and Frankel, (1957); total antioxidant capacity according to Sies, (1997) and urea according to Siest *et al.*, (1981). The animals were hand milked twice daily at 7:00 am and 4:00 pm during the experimental period and daily milk recorded individually. Representative milk samples of about 0.5% of total milk produced were taken once every two weeks from all goats at the morning and evening milking. Milk samples were analyzed for total solids, ash, solids non-fat (SNF), lactose, protein and fat according to the analytical procedures of Ling (1963) using Milk-Scan apparatus.

Collected data of blood biochemical parameters, milk yield and composition and milk constituents yield 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 results 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	35.33	65.31
Ash	9.36	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
Hemicelluloses	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.*

Blood serum parameters

The results of blood serum parameters for lactating goats fed the experimental rations are presented in Table (2). Statistical evaluation showed that R1, R2 and R3 recorded insignificantly differences (P>0.05)

Table (2): Effect of treatments on blood serum some biochemical and enzyme activity.

Item	Experimental ration			±SE
	R1	R2	R3	
Total protein (g/dl)	6.79	6.72	6.85	0.28
Albumin (g/dl)	3.91	3.87	3.91	0.13
Globulin (g/dl)	2.88	2.85	2.94	0.23
Creatinine (mg/dl)	1.32	1.35	1.39	0.11
Urea (mg/dl)	51.69	48.61	59.60	5.05
ALT (U/ml)	20.8	19.6	22.25	3.41
AST (U/ml)	37.2	33.8	35.75	7.77
Total antioxidants capacity (mmol/l)	0.85	0.95	0.90	0.03
Cholesterol (mg/dl)	152	153.8	155.75	3.36
Triglycerides (mg/dl)	121.8	110.6	118.5	3.41

values of total protein, albumin and globulin, creatinine, urea AST, ALT, total antioxidant, triglyceride and cholesterol. These results are in agreement with those obtained by Deraz and Ismail (2001) and Mahrous *et al.* (2011) who found that no significant differences were noticed in blood plasma parameters among all groups fed untreated or fungal treated crop residues and the values were within the normal range. On the other hands, the present results disagree with those obtained by Bassuny *et al.* (2003b) who found that blood components were significantly affected (P<0.05) and higher values of total protein, albumin, urea, GOT and GPT were recorded with urea + fungi treatment followed by urea treatment compared to untreated group.

Milk yield and composition

Milk yield (g) and composition (%) for lactating does fed the experimental rations are presented Table (3). Milk yield for R2 (1120.33g) and R3 (1020.48g) were significantly (P<0.05) increased compared to R1 (930.30g), respectively. Mousa *et al*. (2012) found that live dry yeast supplementation improved daily milk yield by 13.24 and 9.56% for 7.5 and 5 g/h live dried yeast (DY) supplemented groups, respectively, compared with control group. All values of milk composition percentages (Fat, protein, total solids (TS), solids non-fat (SNF), lactose**)** were significantly (P<0.05) higher with R2 and R3 compared with R1 rations**.** In this respect, Mousa *et al.* (2012) reported that percentages of total solids were significantly (P<0.05) higher in live DY supplemented groups than unsupplemented ones. Abd El-Ghani (2004) found that the values of milk energy, protein, TS and SNF were significantly greater in yeast supplemented groups than supplemented one, while the values of milk lactose and ash (%) were not affected with 3 or 6 g yeast day, compared to unsupplemented one.

Table (3): Effect of treatments on average body weight, milk yield and milk composition.

Item	Experimental rations			±SE
	R1	R2	R3	
Body weight (kg)	37.10	37.10	37.20	0.05
Milk yield (g/day)	930.30^{b}	1120.33^{a}	1020.48^{b}	22.10
Milk composition, %:				
Fat	2.99^{b}	3.24^{a}	3.20^{a}	0.04
Protein	2.53^{c}	3.01^{a}	2.85^{b}	0.12
Lactose	4.23^{b}	4.78^{a}	4.44^{ab}	0.13
Total solid (TS)	10.32^{b}	11.65^{a}	11.23^{a}	0.04
Solid not fat (SNF)	7.33^{c}	8.43^{a}	7.99^{b}	0.03
Ash	0.57^{b}	0.64^{ab}	0.70^{a}	0.12
Milk constituents yield (g/day)				
Fat	27.21^{c}	36.14^{a}	31.69^{b}	2.01
Protein	23.02^{c}	33.57^{a}	28.22^{b}	1.57
Lactose	38.50^{b}	53.32^{a}	43.97^{ab}	3.00
Total solids	93.93^{b}	130.18^{a}	110.83^{ab}	6.59
Solid not fat	66.71^{b}	94.04^{a}	79.13^{ab}	5.01

$^{a, b,}$ and ^{c} Means within the same row with different superscripts differ (P<0.05).

Feed intake and feed conversion ratio:

Data of Table (4) showed that the best feed conversion efficiency (FCE), (the lowest values) as Kg DM intake/kg milk was recorded with groups fed R2 followed by R3, the lowest value with R1, being 1.29, 1.33 and 1.34 kg DM intake/ kg milk yield, respectively Also, feed conversion value expressed as (kg TDN/ kg milk) was practically similar for R2 rations either R3 being lower than that of the R1 rations; R2 (0.72) then R3 (0.75) followed by R1 (0.77). The feed conversion values expressed as (g DCP/ kg milk) were 76.03, 83.95 and 96.98 g/kg milk for R2, R3 and R1, respectively. Also, Kholif and Khorshed (2006) reported that feed conversion was significantly the highest with buffaloes fed yeast supplemented rations followed by salinized yeast supplemented ration and then the control. While, Gaafar *et al.* (2009) found that DM, TDN and DCP conversion was better with buffaloes fed ration contained 40% concentrate and 60% roughage with baker's yeast supplementation than supplement one.

Table (4): Effects of feeding experimental rations on goats performance.

Item	Experimental ration		
	R1	R2	R3
Feed intake (g/day):			
CFM	1000	1050	1080
Olive trees by-products	250	400	280
Total DM intake	1250	1450	1360
TDN	676.83	865.50	795.87
DCP	71.62	107.59	95.88
Feed conversion ratio:			
DM kg/ kg milk	1.34	1.29	1.33
TDN kg/ kg milk	0.77	0.72	0.75
DCP g/ kg milk	96.98	76.03	83.95

CONCLUSION

Incorporation of EM1 and El-mofeed to olive trees by-products in lactating Damascus goats rations improved digestibility, nutritive value milk yield, milk composition and feed efficiency.

REFERENCES

Abbeddou, S.; Riwahi S.; Iniguez L.; Zaklouta M.; Hess H.D. and Kreuzer M. (2011). Ruminal degradability, digestibility, energy content, and influence on nitrogen turnover of various Mediterranean by-products in fat–tailed Awassi sheep. Anim Feed Sci Technol. 163:99-110.

Abd El-Ghani, A.A. (2004). Influence of diet supplementation with yeast culture (*Sacharomyces cerevisiae*) on performance of Zaraibi Goats. Small Ruminant Res., 52: 223-235.

Al-Masri MR.Guenther Kd. (1995). The effect of gamma irradiation on *in vitro* digestible energy of some agricultural residues .Wirtschaftseigene Futter. 41:61-68.

AOAC. (1995). Official Methods of Analysis. 15th Ed. Association of Official Analytical Chemists, Arlington, Virginia, USA.

Armstrong, W. D. and C. W. Carr (1964). Physiological. Chemistry 3rd ed. pp., 75 Burges Publishing CO. Minneapolis, Minnesota, USA.

Bassuny, S.M.; A.A. Abdel-Aziz; M. F. El-Sayis and M.A. Aabdulla (2003b). Fibrous crop by-products as feed. 2. Effect of chemical and biochemical treatments on feed intake, nutritive values and some ruminal and blood constituents. Egyptian J. Nutrition and feeds.6 (Special Issue): 901-912.

Croan, S.C. (2000). Conversion of wood waste into value added product by edible and medicinal pleurotus (Fr.) P. Karst. Species (agarics' s.1., Basiomycetes).International Journal of Medicinal Mushrooms, 2:73-80.

Deraz, T. A. and H. Ismail (2001).Cotton stalks treated with white- rot fungus for feeding sheep. Egyptian J.Nutri. and Feeds. 4 (Special Issue): 423-431.

Doumas, B. T.; W. A. Wastson and H. G. Biggs (1971). Albumin standards and the measurement of serum albumin with bromocresol green. Clin. Chem. Acta., 31:87-90.

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

El-Ashry, M.A.; A.M. Kholif; M. Fadel; H.A. El-Alamy; H.M. El-Sayed and S.M. Kolif (2003). Effect of biological treatments on chemical composition, *in-vitro* and *in-vivo* nutrients digestibilities of poor quality roughage. Egyptian J. Nutrition and Feed, 6 (2): 113- 126.

Fayed, M. Afaf; M. A. El-Ashry and Aziz A. Hend (2009). Effect of feeding olive tree pruning by-products on sheep performance in Sinai. World J. Agric. Sci. 5(4) 436-445.

Gaafar, H. M. A.; Mohi El-Din, A. M. A.; Basiuoni, M.I. and El-Riedy, K. F. A. (2009). Effect of concentrate to roughage ratio and baker's yeast supplementation during hot season on performance of lactating buffaloes. Slovak J. Anim. Sci., 42, (4): 188-200.

Kholif, S. M. and Khorshed, M. M. (2006). Effect of yeast or selenized yeast supplementation to rations on the productive performance of lactating buffaloes. Egyptian J. Nutrition and Feeds, 9 (2): 193.

Ling, E.R. (1963). A Text Book of Dairy Chemistry. 3rd Ed. Chapmanad Hall Limited, London.

Mahrous, A. A. and M. M. Khorshed (2012). Improving the nutritive value of rice straw by fungal treatments for feeding sheep. Egyptian J. Nutr. and Feeds.15 (2):247-254.

Mahrous, A. A.; E. H. El-Shafie; and T. M. M. Abdel- Khalek (2011). Performance of Growing lambs fed fungus treated sugarcane bagasse. Egyptian J. of Sheep and Goat Sci. 6(1): 27-35.

Ministry of Agriculture (2012). Bulletin of the Agricultural Statistics. Part (2) Summer &Nilicrops.211

Molina-Alcaide E., & Nefzaoui A. (1996). Recycling of olive oil by-products: possibilities of utilization in animal nutrition. Int Biodeterior Biodegrad. 38:227–235.

Mousa, Kh.M.; El-Malky, O.M.; Komonna, O.F. and Rashwan, S.E. (2012). Effect of some yeast and minerals on the productive and reproductive performance in ruminants. Journal of American Science. 8(2): 291

NRC (1981). Nutrient Requirements of goats. National Academy of sciences- National Research council, Washington D. C., USA.

Reitman, S. and S. Frankel (1957). Colorimetric determination of GPT activity according to the Reitman and Frankel method. Am. J. Clim. Path.28.Res38:191-195.

SAS (2004). SAS/STAT 9.1.3 User's Guide: Statistical Analysis System Institute Inc., Cary, NC, USA.

Sies, H. (1997). Oxidative stress: oxidants and antioxidants. Exp. Physiol., 82(2), 291–295.

Siest, G.; J. Henny and F. Schiela (1981). Interpretion des examens de laboratories, PP. 206, Karger Ed.

Snedecor, W. and W. Cochran (1980). Statistical Methods. Iowa State University Press, Ames Iowa, seventh edition.

Teimouri Yansari, A., H. Sadeghi, Z. Ansari-Pirsarai and H. MohammadZadeh, (2007). Ruminal dry matter and nutrient degradability of different olive cake by–products after incubation in the rumen using nylon bag technique. Int. J. Agric. Biol., 9: 439–442.

Van Soest, P .J.; J. D. Robertson and B. A. Lewis (1991).Methods for dietary fibre, neutral detergent fiber and non–starch polysaccharides I n relation to animal nutrition . Journal of Dairy Science, 74:3583-3595.

المعاملة البيولوجية والكيمائية لمخلفات تقليم اشجار الزيتون لتغذية المعز الدمشقى الحلابه

احمد عبد الرحمن محروس[1] وايمن سعيد كركوتلى[2] وعلاء 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.

تهدف هذه الدراسة إلى بحث تأثير تغذية المعز الدمشقى الحلاب على علائق محتوية على مخلفات تقليم اشجار الزيتون ومعاملتها سواء معاملة بيولوجية باضافة محلول (EM1) او عن طريق معاملة كيمائية باضافة المحلول المغذى المفيد (El-mofeed) وتأثير ذلك علي الأداء الإنتاجي وقياسات الدم والكرش ومحصول اللبن ومكوناته. لتحقيق هذا الهدف تم استخدام ثمانية عشر عنزة قسمت بعد الولادة الى ثلاث مجاميع متساوية بمتوسط وزن 0.20±37.20 كجم (6 حيوانات فى كل مجموعة) واستمرت التجربة لمدة 120يوم وغذيت علي العلائق الآتية:

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

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

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

وأظهرت النتائج ما يلى:

سجلت كلا من المجموعة الثانية التى غذيت على مخلفات تقليم الزيتون مع المعاملة بمحلول EM1 والمجموعة الثالثة التي غذيت على مخلفات تقليم الزيتون مع المعاملة بالسائل المغذى المفيد (El-mofeed) أفضل النتائج بالنسبة لإنتاج اللبن ومكوناته من البروتين والدهن بالمقارنة بمجموعة المقارنة وبالنسبة لقياسات الدم لم تكن هناك اى فروق معنوية بين المجاميع الثلاثة فى تركيز كل من البروتين الكلى و الألبيومين و الجلوبيولين و اللبيدات الكلية والجلوكوز والجلسيريدات الثلاثية والكوليستيرول ومضادات الاكسدة واليوريا وتركيزات أنزيمات الكبد ALT and AST. يستخلص من هذا البحث أن المعاملات البيولوجية او الكيمائية خاصة الامنة خصوصا المعاملة ب EM1 كان له تأثيراًمعنوياً على تحسين الإستفادة من الغذاء للماعز الشامى الدمشقى الحلابة كما ذاد محصول اللبن ومكوناته مع العليقة الثانية.