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IMPACT OF DIFFERENT FORMS OF OILS ON PRODUCTIVE PERFORMANCE AND CONJUGATED LINOLEIC ACID CONTENT IN GOAT'S MILK.

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SUMMARY

This work aimed to investigate the effect of supplementing different forms of plant oils (oils or oil seeds) to lactating goat's diet on milk yield and milk composition .Eighteen Demishki lactating goats of 2-3 years old and live body weight of about 38-42 Kg were divided into three blocks (6 animals each) inside each block there are three experimental rations except first block contained only one ration (R1) (control). The second block included R2, R3 and R4 rations (oil seeds block) while, the third block included R5, R6 and R7 rations (oils block). Animals in all treatments were received 3.5 %(oils or seeds and the amount of seeds contained 3.5% oil) over requirement. Results indicated that supplementation of oil seeds increased milk yield as fat corrected milk (FCM) and the highest FCM (2.48 kg/h/d.) was recorded with SFS (sunflower seeds) group. There was a decrease in milk fat of goats fed either R3 or R4 compared with those fed R1. Also, goats fed R5recorded the lowest protein content (2.47%) compared with control. Supplementation oil seeds and oils in goat's rations slightly reduced the apparent digestibility of CFD compared with control. The different forms of oil seed did not influence ruminal pH but it caused significant ($P<0.05$) decrease in ruminal ammonia concentrations for all groups compared with control. While, the concentration of ruminal volatile fatty acids was insignificantly ($P<0.05$) differ for all goats except those fed rations R3 and R4 compared with control. The fatty acid (FA) profile of milk was altered by oils supplementation whereas. feeding oils reduced the proportion of both short-chain (C12:0) and medium-chain (C16:0) fatty acids, and feeding oil seeds increased the proportion of long-chain (≥ C18:0) fatty acids in milk fat. The inclusion of oils seeds increased the concentration of CLA in milk fat and the highest (30 mg/g milk fat) was recorded with SFS ration followed by SBS (soybean seeds) ration (21.5 mg/g milk fat) compared to (8.5 mg/g milk fat) for control. The results of this study indicated that feeding oils seeds increased polyunsaturated fatty acids and decreased saturated fatty acids in milk fat.

From the previous results. it can be concluded that using oil seeds, especially sunflower seeds, in lactating goat's rations enhance CLA content in milk without adverse effects on goat's health or performance.

Keywords: *oil seeds; CLA; rumen fermentation; digestibility; lactating goat.*

INTRODUCTION

The topic of Conjugated linoleic acid (CLA) as it relates to ruminant production has been reviewed previously (Griinari and Bauman, 1999, Dhiman, 2000, Chilliard, *et al.,* 2001). Conjugated linoleic acid is a component of milk fat that has been shown in recent years to have numerous potential benefits for human health, including potent cancer-fighting properties. This is especially interesting considering that most of natural anti-carcinogens are of plant origin. Since, CLA is a product of ruminant animals, bovine milk and milk products are among the richest dietary sources. Conjugated linoleic acid is formed in the rumen as an intermediate product in the digestion of dietary fat. The forages and grains fed to dairy cows are characterized by a relatively high content of linoleic (18:2) and linolenic (18:3) acid. Kepler and Tove (1967) showed that *cis*-9, *trans*-11 18:2, the major isomer of CLA, is the first intermediate formed during the biohydrogenation of linoleic acid via rumen bacteria, *butyrivibrio fibrisolvins*. The CLA content in milk varies from a low 0.2% or less to a high 2%and affected by diet, animal, and post-harvest related factors. From these previous factors, animal diet appears to be the most affecting factor so, it has been given its due importance in enhancing the CLA content of food products (Dayani *et al.*, 2003).

Oilseeds have generally high concentrations of oleic and linoleic acids, which are effective antiprotozoal agents. Dietary supplementation of sunflower seed oil to sheep reduced protozoa numbers in rumen fluid dramatically within 5 day from approximately 1 million to fewer than 200,000/ml (Ivan *et al.*, 2001). Partial defaunation has been reported to increase milk yield by 13.5% and the protein-to-fat ratio by 13.3% (Moate, 1989). Therefore, oilseeds and oil-rich products such as soybeans appear to be potential feed ingredients to control protozoa populations in ruminants, and so to increase the efficiency of dietary protein utilization. Also diets that are high-concentrate, low-fiber, or supplemented with high amounts of plant oils can cause a drop in feed intake and therefore in milk fat secretion in dairy cows and Decreased milk production (Chichlowski *et al.*, 2005, Flowers *et al.*, 2008, Rego *et al.*, 2005b).

Meanwhile, the objective of this study was to investigate the impact of oils and oilseeds on the content CLA in goat's milk.

MATERIALS AND METHODS

This experiment was carried out at the Experimental Station of Animal Production Research Institute during summer season 2009-2010

Lactation trial:

Eighteen Demishki lactating goats, aged 2-3 years and weight38-42 Kg live body, were divided into three blocks (6 animals each) inside each block. Animals were fed one of three experimental rations except first block contained only one ration (control). Animal inside each block were investigated in three consecutive treatments groups (two animals each) using 3 × 3 Latin square design for 66 days and consisted of three equal periods (22 days each, 15 days preliminary period followed by 7 days collection period).

Oil content was determined in tested seeds and the amount of seeds contained 3.5% oil was supplemented to the ration R5, R6 and R7.

The experimental rations were:

R1 = Concentrated feed mixture, CFM, (60%) + clover hay, CH (40 %).

R2 = CFM + sunflower seeds, SFS+ CH

R3 = CFM + linseeds, LS+ CH

R4 = CFM + soybean seeds, SBS+CH

R5 = CFM + soy oil (3.5%) + CH

R6 = CFM + linseed oil (3.5%) + CH

R7= CFM + sunflower oil (3.5%) + CH

The first block included R1 ration (control), while rations R2, R3 and R4 were in the second block, oilseeds block, and R5, R6 and R7 were in the third block, oil block.

Rations were fed to cover total requirements of lactating goats as recommended by NRC (1985) and offered once daily at 10:00 AM .Milk yield for each animal was recorded via hand milking at the end of collection period by injection of oxytocin hormone and sample, represents tenth of milk, for fatty acid profile from each animal was taken, then at the end of lactation trials milk samples for each ration were mixed and re- presented sample was taken for fatty acid analysis. But samples that used for milk composition analysis were collected three times (at first, third and seventh day) of the collection period and analyzed via milk scan. Actual milk yield was corrected to 4% FCM according to the formula of (Gaines, 1928).

Digestibility trial and rumen parameters:-

At the end of each lactation trial, feces samples were collected for three successive days via bag technique from each animal to determine total tract apparent nutrient digestibility using acid insoluble ash(AIA) technique as internal marker according to Van- Keulen and young (1977)

Ruminal fluid samples were collected at the end of the experiment using stomach tube before feeding then at 2and 4 hrs after feeding. Samples of rumen content, for each animal, were filtered through four layers of cheesecloth, and then ruminal pH was immediately recorded using digital pH meter then, samples were stored at -20 C for latter analyses.

Analytical procedures:

Representative samples of feed ingredients and feces were analyzed for DM, OM, CP, EE, CF and ash according to A.O.A.C. (1995). Ruminal ammonia nitrogen (NH3-N) concentration was determined according to Conway (1962). Ruminal total volatile fatty acids (TVFA's) concentration was determined according to Warner (1964). Milk analysis was determined using milko scan (model 130 series – type 10900 FOSS electric – Denmark) Fatty acids in milk were determined by gas liquid chromatograph (GLC) according to farag *et al.* (1986).

Statistical analysis:

Data collected for digestibility trials and fatty acid profile were subjected to statistical analysis as one way analysis of variance using SAS (1999) according the following model: $Y_{ij} = \mu + T_i + e_{ij}$.

Where: Yij= the observation. μ = Over all mean Ti = Effect of treatment e_{ij} = Experimental error.

While, data collected for milk yield and milk composition were statistically analysis the following model: $Y_{ijkl} = \mu + P_i + F_j + T_k + (FT)_{jk} + e_{ijkl}$

Where: Y_{ij}= the observation. μ = Over all mean P_i = Effect of period. F_j = Effect form of oil (oil or oil seeds). $(FT)_{jk}$= Effect of type of (oil or oil seeds) form of oil (oil or oil seeds) and type of (oil or oil seeds) and e_{ijkl} = Error.

Also, data of ruminal parameters were statistically analysis the following model:

$Y_{ijk} = \mu + S_i + T_j + (ST)_{ij} + e_{ijk}$.

Where: Y_{ijk}= the observation. μ = Over all mean S_i = Effect of time of sampling. T_j = Effect treatment

$(ST)_{ij}$= Effect of interaction between time of sampling and treatment and e_{ijk}= Error.

Duncan's multiple range test (Duncan, 1955) was used to separate means when the dietary treatment effect was significant (P < 0.05).

RESULTS AND DISCUSSION

Chemical composition of feed ingredients and tested rations in Table (1) indicated that chemical composition of concentrate feed mixture, CFM, and clover hay, CH, were in agreement with the findings of Shahin *et al.* (2006). The highest CP content was recorded with soybean seeds, SBS, (40.00%) and the same ingredient had the lowest CF content (9.30%) compared with other oil seeds and at the same time, the chemical composition of oil seeds was in agreement with those found by Glasser *et al.* (2008).Data in the same table indicated that all of the experimental rations were nearly similar in its chemical composition except that supplemented with oil or oil seeds were higher in EE content compared with the control ration. These results agreed with the findings of Mirzaei *et al.* (2009) that supplementation rations with oil or oil seed increased EE content in ration.

Data in table (2) indicated that supplementing oil in lactating goats ration didn't significantly (P<0.05) affect on milk yield while supplementation of oilseeds significantly (P<0.05) increased the milk yield compared with control, being 1.96 kg/h/d. On the other hand, there was significant (P<0.05) increases in FCM by 8.28% when oilseeds was supplemented to rations compared with control. This increase in milk yield may be due to increase energy content of rations by supplementing (oil or oil seeds) as mentioned by DePeters and Cant, 1992 and Chilliard et al., (2001) that milk yield was increased by feeding cows on fat supplemented rations at mid or even late lactation period. Data in the table indicated that There was insignificant (P<0.05) difference between oils or oilseeds rations on milk yield while, supplementing oilseeds significantly (P<0.05) increased milk yield compared with oils supplementation. This result agreed with findings of Caroprese *et al.* (2010) that milk yield was numerically higher for cow feeding flaxseed than control cows (24.00 vs. 22.45).Oils supplementation didn't significantly (P<0.05) affect on fat, protein total solid and solid non fat contents, but it significantly (P<0.05) increased lactose content by 7%, compared with control. Supplementing oilseeds significantly (P<0.05) increased the protein milk content (3.02%), but it significantly (P<0.05) decreased milk contents of lactose and solid non fat (3.70 and 7.12%), respectively compared with control, being 2.80, 3.92 and 7.55%, in the same order. This increase in milk protein for goats fed rations contained oil seeds, may be due to that administration of oil seeds could have increased the flow of N to the duodenum because of its greater bypass protein content meanwhile, the AA availability for protein synthesis in the mammary gland increased (Caroprese *et al.,* 2010). While, oilseeds supplementation didn't significantly affect on fat and total solids content in milk.

Table (1): Chemical composition of feed ingredients and experimental rations (as DM basis).

Item	Chemical composition, %						
	DM	OM	CP	CF	EE	NFE	Ash
Feed ingredients							
CFM	90.70	91.9	14.10	10.65	2.65	64.5	8.10
CH	88.93	86.43	12.17	29.07	2.74	42.45	13.57
SFS	90.00	96.30	19.60	22.50	44.00	10.2	3.70
LS	93.04	96.30	18.29	27.30	42.16	8.55	3.70
SBS	91.46	95.00	40.00	9.35	19.94	25.71	5.00
Tested rations							
R1	89.81	89.17	13.13	19.82	2.70	53.52	10.83
R2	89.81	89.43	13.34	19.94	6.20	49.95	10.57
R3	89.96	89.41	13.31	20.10	6.20	49.80	10.59
R4	89.86	89.38	14.00	19.49	6.20	49.69	10.62
R5-R7	89.81	89.17	13.13	19.86	6.20	49.98	10.83

CFM = Concentrate feed mixture CH = Clover hay SFS = Sunflower seeds LS = linseeds
SBS = Soybean seeds R1 = CFM + CH R2 = CFM + CH + SFS R3 = CFM + CH+ LS
R4= CFM + CH+ SBS R5 = CFM + CH+ soy oil (3.5%) R6 = CFM + CH+ linseed oil (3.5%)
R7 = CFM + CH+ sunflower oil (3.5%).

Table (2): Effect of oil form on milk production and its composition.

Item	Form of oil			
	R1	Oils	Oil seeds	±SE
Milk production, kg/h./d				
Milk yield	1.81 [b]	1.87 [b]	1.96 [a]	0.09
FCM	1.79 [b]	1.78 [b]	2.00 [a]	0.09
Chemical composition, %				
Fat	3.95 [ab]	3.73 [b]	4.16 [a]	0.34
Protein	2.80 [b]	2.67 [b]	3.02 [a]	0.150
Lactose	3.92 [a]	3.65 [b]	3.70 [b]	0.158
Total solids	11.35	11.19	11.28	0.680
Solids non fat	7.55 [a]	7.46 [a]	7.12 [b]	0.302

[a, b, c....] *Means with different superscripts in the same column differ significantly (P<0.05)*

Data in table (3) showed that feeding goats on ration contained sunflower seeds recorded the highest milk production (either actual milk or FCM) and the best milk composition compared with other oilseeds. This priority for sunflower seeds ration may be due to increase oil content of sunflower seed and percent of unsaturated fatty acids compare to other oil seeds

The same trend was observed with sunflower oil ration in table (4) where the best results of milk production and milk composition were recorded with sunflower oil compared with other oils rations.

Results that reflect the effect of the experimental rations on milk production and composition are presented in Table (5). Data in the table showed that incorporating either oils or oil seeds in lactating goat's rations lead to a significant (P<0.05) increase in milk production by 26, 18, 28, 18 and 19 %, respectively for R2, R3, R4, R6 and R7 compared with R1, while incorporating soy oil in R5 significantly (P<0.05) decreased milk yield by 3% compared with R1. There was a significant (P<0.05) increase in FCM when goats fed rations R2, R4, R6 and R7, being 2.48, 2.19, 2.31 and 2.41 kg/h/d., respectively compared with those fed R1 (1.82 kg/h./d). On the other hand, there was insignificant (P<0.05) difference in FCM among goats fed R3, R5 and R1. Milk fat content was insignificantly (P<0.05) affected for goats fed R1, R2, R5, R6 and R7 and significantly (P<0.05) decreased by feeding goats R3, R4 compared with R1. There were many explanations for milk fat depression with fat supplementation in animal diets, that fat feeding might have negative effects on rumen fiber digestion, thus decreasing acetic and butyric acid production meanwhile, affecting the *de novo* fat synthesis in mammary gland (Griinari *et al.*, 1998). Or, when fat is included in the ration the uptake and direct incorporation of Long–chain fatty acids into triglycerides by mammary gland are increased (Palmquist and Jenkins, 1980). Therefore, milk fat content will respond to the balance between a fatty acid uptake and secretion by the mammary gland, resulting in a decrease in *de novo* synthesis. There was a insignificant (P<0.05) difference in milk protein concentration among goats fed R3, R6 and R7 compare with control ,while, feeding goats either R2 or R4 significantly (P<0.05) increased milk protein concentration by 3.29 and 3.21% compared with those fed R1.

Table (3): Effect of oil seed source on milk production and its composition.

Item	Type of oil seeds			
	SFS	SBS	Ls	±SE
Milk production, kg/h./d				
Milk yield	2.13 ^{a}	1.96 ^{b}	1.94 ^{b}	0.153
FCM	2.17^{a}	1.88 ^{b}	1.84 ^{b}	0.149
Chemical composition, %				
Fat	4.16 ^{a}	3.65^{b}	3.38 ^{b}	0.26
Protein	3.02 ^{ab}	3.15 ^{a}	2.90 ^{b}	0.174
Lactose	3.71 ^{ab}	3.63 ^{b}	3.76 ^{a}	0.105
Total solids	11.61 ^{a}	11.4^{a}	11.03 ^{b}	0.327
Solids non fat	7.46 ^{ab}	7.42 ^{b}	7.61 ^{a}	0.165

a, b……Means with different superscripts in the same column differ significantly (P<0.05)

Table (4): Effect of Type of oil on milk production and its composition.

Item	Type of oil			
	SFo	SBo	Lso	±SE
Milk production, kg/h./d				
Milk yield	1.93^{a}	1.92^{a}	1.76^{b}	0.15
FCM	2.14^{a}	1.77^{a}	1.85^{b}	0.11
Chemical composition, %				
Fat	4.64^{a}	3.49^{b}	4.37^{a}	0.30
Protein	2.68	2.62	2.70	0.14
Lactose	3.94^{a}	3.41^{b}	3.59^{b}	0.17
Total solids	12.02^{a}	10.18^{b}	11.37^{b}	0.36
Solids non fat	7.38^{a}	6.69^{c}	6.95^{b}	0.26

a, b, c……Means with different superscripts in the same column differ significantly (P<0.05)

Table (5): Effect of experimental rations on milk production and its composition

Item	experimental rations							±SE
	R1	Oil seeds			Oils			
		R2	R3	R4	R5	R6	R7	
Milk production, kg/h./d.								
Milk yield	1.78^{c}	2.25^{a}	2.10^{b}	2.28^{a}	1.73^{d}	2.10^{b}	2.12^{b}	0.02
FCM	1.82^{d}	2.48^{a}	1.99^{d}	2.19^{c}	1.75^{d}	2.31^{b}	2.41^{ab}	0.05
Chemical composition, %								
Fat	4.73^{a}	4.73^{a}	3.63^{b}	3.63^{b}	4.16^{a}	4.55^{a}	4.72^{a}	0.23
Protein	2.87^{bc}	3.21^{a}	2.92^{b}	3.29^{a}	2.47^{d}	2.77^{c}	2.66^{cd}	0.12
Lactose	4.21^{a}	3.83^{c}	3.84^{c}	3.83^{c}	3.95^{b}	3.61^{d}	3.90^{bc}	0.05
Total solids	11.52^{bc}	12.14^{a}	11.35^{bc}	11.31^{bc}	11.05^{c}	11.66^{ab}	12.01^{a}	0.24
Solids non fat	6.79^{e}	7.41^{b}	7.72^{a}	7.68^{a}	6.89^{e}	7.11^{d}	7.29^{c}	0.05

a, b, c…… Means with different superscripts in the same row differ significantly (P<0.05).

R1 = CFM + CH. R2 = CFM + CH + SFS. R3 = CFM + CH+ LS. R4= CFM + CH+ SBS.

R5 = CFM + CH+ soy oil (3.5%). R6 = CFM + CH+ linseed oil (3.5%). R7 = CFM + CH+ sunflower oil (3.5%).

On the other hand, there was a significant (P<0.05) decrease in milk protein concentration by 7% when goats fed Ration R6 compared with those fed R1. This result is in agreed with the findings of Gómez-Cortés *et al.*, 2008) that supplemented diet with soybean oil (SBO) tended to decrease the milk protein content (approximately 10%; P<0.10), also Ikwuegbu and Sutton (1982) found that protein digestion in the rumen decreased and N flow to the duodenum decreased when linseed oil was infused in sheep rumen because of a reduction in rumen fauna.

Feeding oil or oil seeds led to a significant (P<0.05) decrease in milk lactose for goats fed rations R2, R3, R4, R5, R6 or R7 compared with those fed control ration by 9.02%, 8.78%, 9.02%, 6.17%, 14.25% and 7.36%, respectively. There were insignificant (P<0.05) differences among goats fed R3, R4, R5 and R6 compared with R1 (control) in milk total solids This result agreement with the findings of DaSilva *et al.* (2007), while, the highest significant (P<0.05) values were recorded with goats fed either R2 or R7 compared with those fed control ration, being 12.14, 12..01 and 11.52%, respectively.

There were a significant (P<0.05) increase in milk solid non fat for goats fed all the experimental rations This result agreed with findings of Dai *et al.*, (2011)except for those fed R5 which was insignificantly (P<0.05) differ compared with those fed R1.

Data in Table (6) shows that incorporating oils or oilseeds in lactating goat's rations didn't significantly (P<0.05) affect OMD and CPD compared with control, being 71.06 and 71.77%, 72.56 and 72.35%, 71.61 and 74.93%, 71.92 and 73.24%, 70.19 and 75.24%, 70.37 and 74.15% and 70.58 and 71.06% for R1, R2, R3, R4, R5, R6 and R7, respectively. These results are in agreement with findings of Hristov *et al.* (2009) that adding oils in lactating cow rations didn't affect digestibility of OMD and CP. There was a significant (P<0.05) decrease in DMD by10.76 %, 9.73% , 6.93% , 6.93 % for goats fed R2, R4 and R6 compared with those fed R1 while, there was insignificant (P<0.05) difference among R3, R5 and R1 for the same item.. These results agreed with the finding of AL-Dobaib (2009) that there was decrease in DMD when camel were fed rations contained sunflower oil by 2 and 4% of DM for basal diet.

Table (6): Digestion coefficients and nutritive values of tested rations fed to goats.

Item	Tested rations							SE±
	R1	R2	R3	R4	R5	R6	R7	
Digestion coefficients, %								
DMD	77.11 ^{a}	68.81 ^{b}	72.52 ^{ab}	69.60 ^{b}	72.24 ^{ab}	71.76 ^{b}	71.76 ^{b}	2.5
OMD	71.06	72.56	71.61	71.92	70.19	70.37	70.58	1.88
CPD	71.77	72.35	74.93	73.24	75.24	74.15	71.06	2.68
CFD	69.11 ^{a}	65.65 ^{ab}	66.49 ^{ab}	68.18 ^{a}	61.67 ^{bc}	61.70 ^{bc}	61.08 ^{c}	2.60
EED	71.46 ^{b}	72.02 ^{ab}	71.65 ^{b}	71.34 ^{b}	75.13 ^{a}	72.06 ^{a}	74.05 ^{a}	1.56
NFED	71.10 ^{b}	73.20 ^{ab}	73.29 ^{ab}	75.25 ^{a}	72.73 ^{ab}	74.40 ^{a}	71.10 ^{b}	1.47
Nutritive values, %								
DCP	9.31	9.45	9.63	10.05	9.33	9.48	9.31	0.43
TDN	68.59	69.81	69.60	69.91	69.69	67.72	68.17	2.13

a, b, c..... Means with different superscripts in the same row differ significantly (P<0.05).

The digestion coefficient of CF was decreased insignificantly (P<0.05) when goats fed seeds (R2, R3 or R4) or significantly (P<0.05) when goats fed oil (R5, R6 or R7) compared with those fed R1, being 61.67%, 61.70% and 61.08 respectively. The decrease in CFD may be due to the negative effect of oils on rumen microbes especially cellulatic bacteria. In this context, the depression effect for oilseed was less than that for oils as a result of more escaping oils from rumen fermentation in the case of oilseed. These results are consistent with the findings of Jenkins and Fotouhi (1990).

Data in the same table shows that the there was insignificant difference (P<0.05) in the digestibility of EED among goats fed R2, R3 , R4 and control while, feeding goats rations R5, R6 or R7 significantly (P<0.05) increased EED by 5.1% , 0.83% and 3.62% compared with control. This increase in the digestibility of EE for groups fed oil seeds may be due to that seeds make a kind of protection for its content of oils and this make oil escape from rumen micro organisms and bypass to intestine and degraded by lipase enzymes, this agree with finding of Poleis *et al.* (2010)

There was insignificant (P<0.05) difference in the digestibility of NFE among goats fed R2, R3, R5 and R7 compared with those fed R1, while there was insignificant (P<0.05) difference when goat fed R2,

Table (7). Effect of feeding experimental rations on some of rumen parameters of lactating goats .

Item	Tested rations								±SE
	Sampling Time ,hr	R1	R2	R3	R4	R5	R6	R7	
pH	0	6.29	6.3	5.92	5.99	6.12	5.97	6.22	
	3	6.27	5.92	5.50	5.87	5.87	5.81	5.92	
	6	6.21	6.11	5.86	5.99	5.99	5.91	6.06	
	Mean	6.26	6.11	5.76	5.87	5.95	5.98	6.07	0.29
NH_3-N,mg / ml RL	0	14.35	11.57	11.73	11.51	10.78	11.67	10.92	
	3	14.07	12.64	12.94	12.15	11.84	12.47	12.96	
	6	14.14	11.3	11.84	11.68	10.92	10.7	11.10	
	Mean	14.19^{a}	11.83^{bc}	12.17^{b}	11.78^{bc}	11.18^{bc}	11.61^{bc}	10.66^{c}	0.59
TVFA's mg/ml RL	0	2.69	2.3	1.92	1.98	2.39	2.05	2.03	
	3	3.11	2.84	2.04	2.56	2.53	2.84	2.91	
	6	2.30	2.80	1.89	2.30	2.65	2.34	2.24	
	Mean	2.82^{a}	2.65^{a}	1.95^{b}	2.28^{ab}	2.52^{a}	2.41^{a}	2.39^{a}	0.3

a. b. c...... Means with different superscripts in the same row differ significantly (P<0.05)

R3, R5 and R7 compare to control. There was a significant ($P<0.05$) increase in NFED when goats fed R1 or R7 compared with those fed control ration. This increase may be due that adding oils or oilseeds inhibited the cellulatic bacteria in the rumen meanwhile, the ruminal microorganisms more depended on the soluble carbohydrates as energy source (Hristov *et al.*, 2009).

Data in the same table indicates that there was no significant ($P<0.05$) effect for oils or oilseeds incorporation in rations on the nutritive value expressed as TDN or DCP. This result agrees with the findings of Soliman (2004).

Data in table (7) showed that there was no significant ($P<0.05$) differences of the mean of ruminal pH among treatments compared with control ration (R1). Data in the same table indicated that there was a significant ($P<0.05$) decrease of the mean of ruminal ammonia concentration in the rumen of goats fed all of experimental rations compared with those fed control ration, being for 11.83%, 12.17%, 11.78% , 11.18% , 11.18% , 11.61% , 10.66% and 14.19% for R2, R3, R4, R4, R5, R6, R7 and R1, respectively. This decrease of ruminal ammonia concentration may be due to that addition of fat cause a reduction in the numbers of protozoal population in the rumen resulting to a reduction of microbial protein proteolysis and the decrease in microbial nitrogen recycling (Broudiscou *et al.*, 1994 and Ivan *et* al., 2001). This result agrees with findings of Mirzaei *et al.*, (2009). There was no significant ($P<0.05$) difference of the mean of ruminal VFA concentration among goats fed R1, R2, R4, R5, R6 and R7, while, it was significantly ($P<0.05$) decreased by 31%with feeding goats R3 compared with control, this depression may be due to The addition of fat partially rep aces the nonstructural carbohydrates in the feed and so reduces the fermentable carbohydrate available for VFA production, which results in a decrease in the total VFA concentration in the rumen. This result agreed with the finding of (Chichlowski, 2005).

Table (8) represents the effect of experimental rations on fatty acid profile of goat's milk. Data showed that feeding goats experimental rations which contain oils (R5 ,R6 and R7) led to decreased milk fatty acids, C12:0 and C16:0 compared with other diet which contain oil seeds((R2 ,R3 and R4) probably because of the potential inhibitory effect of the dietary PUFA or its metabolites on de novo FA synthesis in the mammary gland (Palmquist and Griinari, 2006; Kadegowda *et al.*, 2009) or a dilution effect. This result may be a positive goal for human health perspective because that consuming foods contain high proportions of C14:0 and C16:0 has been associated with human cardiovascular problems (Noakes *et al.*, 1996). On the other hand, Feeding goats on oils or oilseeds except linseed, rations significantly ($P<0.05$) increased the content of milk from C18 FA. This result agrees with findings of Mustafa *et al.*, (2003). The increase of C18:1 may be the result of partial biohydrogenation of C18:2 and C18:3 FA and of the desaturation of C18:0 in the mammary gland (Kennelly, 1996). Or that feeding ruminants on rations contain oil seed cause an increase in mammary uptake of long-chain FA absorbed in the intestine and a decrease in mammary de novo synthesis (Palmquist *et al.*, 1993).

Table (8): Fatty acid profile of goat's milk fed experimental rations.

Experimental rations	Fatty acids, mg/g milk fat						
	C12:0	C14:0	C16:0	C18:0	C18:1	C18:2	CLA
R1	121.1^{b}	62.7^{c}	181.6^{d}	60.7^{c}	92.7^{f}	25.7^{b}	8.5^{f}
R2	104.4^{c}	17.9^{d}	294.1^{a}	94.6^{b}	282.0^{b}	39.9^{a}	30.00^{a}
R3	103.2^{c}	12.2^{d}	250.6^{b}	103.3^{a}	273.9^{c}	24.7^{b}	17.9^{c}
R4	164.8^{a}	53.2^{c}	231.5^{c}	45.6^{d}	124.0^{e}	20.9^{c}	21.5^{b}
R5	23.1^{e}	628.4^{a}	23.2^{f}	7.1^{g}	263.0^{d}	4.1^{e}	15.1^{d}
R6	32.00^{d}	531.4^{b}	45.8^{e}	17.9^{e}	263.2^{d}	13.6^{d}	14.4^{e}
R7	24.7^{e}	631.1^{a}	22.3^{f}	17.1^{f}	291.5^{a}	4.8^{e}	15.3^{d}
± SE	6.63	6.69	6.19	3.22	12.98	3.22	1.50

$^{a, b, c......}$ *Means with different superscripts in the same column differ significantly ($P<0.05$).*

Data showed that there was a significant ($P<0.05$) increase in CLA content of milk when goats fed rations contained oilseeds compared with control, being 30 , 17.9 and 21.5 mg/g milk fat. It was observed that oilseeds rations, R2, R3 and R4, were more effective on CLA content than oil rations R5, R6 and R7, also, and the highest concentration of CLA in milk was observed with goats fed SFS ration (R2). This result may be due to the higher proportion of linoleic acid in the sunflower seeds (66.8g /100g of total F.A. Glasser *et al.*, 2008) relative to the soybeans (53.5g /100g of total F.A. Glasser *et al.*, 2008). This result agrees with finding of Griinari and Bauman (1999) that CLA and TVA were produced in the rumen as intermediates in the biohydrogenation of linoleic acid and that a fraction of the CLA in milk may have been synthesized in the mammary gland from TVA by the action of the 9-desaturase enzyme. While, incorporation oils in rations may be led to low adaptation of ruminal microorganisms to the oil supplement and perhaps may be due to increase extent of ruminal biohydrogenation (Kennelly, 1996)

From the previous results, it could be concluded that using oil seeds, especially sunflower seeds, in lactating goat's rations enhance CLA content in milk without adverse effects on goat's health or performance.

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تأيثر الاشكال المختلفة للزيوت على الاداء الانتاجى والمحتوى من حامض اللينوليك المرتبط فى الماعز الحلابة.

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تهدف هذة الدراسة الى دراسة تأثير أضافة مصادر مختلفة من الزيوت النباتية (زيوت أو بذور زيتية) الى علائق الماعز الحلابة وتأثيرها على الانتاج و التركيب الكيماوى اللبن . ثمانية عشر ماعز حلابة دمشقى عمر 2-3 سنوات وبمتوسط وزن 38-42 كجم قسمت الى ثلاثة مجموعات (ستة حيوانات فى كل مجموعة) فى كل مجموعة يوجد ثلاثة علائق ماعدا المجموعة الاولى تحتوى على عليقة واحدة الكنترول (R1 بدون أضافة) ، المجموعة الثانية تتضمن على علائق R2 (بذور عباد الشمس)، R3 (بذور الكتان) و R4 (بذور فول الصويا) (مجموعة البذو الزيتية) بينما المجموع الثالثة تتضمن على العلائق R5, (زيت عباد الشمس) R6, (زيت الكتان) و R7 (زيت الصويا)) (مجموعة الزيوت). جميع المعاملات تم إضافة الزيت الى العليقة بمعدل 3.5 % فوق الاحتياجات وتتم اضافة البذور الزيتية بالكمية التى تعادل هذة النسبة من الزيت. واوضحت النتائج انة أضافة البذور الزيتية أدت الى زيادة كمية اللبن المعدل (FCM) واعلى كمية كانت (2.48كجم / الراس/اليوم) وكان هذا فى المجموعة المغذاة على بذور عباد الشمس(R2) وكان هناك إنخفاض فى محتوى اللبن من الدهن للحيوانات المغذاة على العلائق R3و R4 بالمقارنة بالكنترول وسجلت الحيوانات المغذاة على العليقة R5 أقل قيمة فى محتواها من بروتين اللبن (2.47%) بالمقارنة بالكنترول. أضافت البذور الزيتية و الزيت الى علائق الماعز الحلابة أدى الى تقليل معاملات هضم الالياف بشكل طفيف بالمقارنة بالكنترول . أختلاف شكل االزيت لم ويوثر على درجة حموضة الكرش ولكنها أدت الى انخفاض معنوى فى محتوى الكرش من الأمونيا لكل المجاميع بالمقارنة بالكنترول بينما المحتوى من الأحماض الدهنية الطيارة لم يختلف معنويا بين المعاملات ماعدا المعاملة R3 وR بالمقارنة بالكنترول و كان هناك تغيير فى المحتوى من الاحماض الدهنية فى المعاملات التى تتغذى عى الزيوت حيث أنة وجد ان التغذية على الزيوت أدت الى تقليل نسبة الاحماض الدهنية قصيرة السلسلة (C12:0) و متوسطة السلسلة (C14:0) بينما التغذية على البذور الزيتية أدت الى زيادة نسبة الاحماض طويلة السلسلة (≥ C18:0) فى دهن اللبن وزيادة المحتوى من حامض اللينوليك المرتبط وكانت أعلى نسبة (30 ملجم / جم دهن لبن)موجودة فى المعاملة المغذاة على بذور عباد الشمس تليها المعاملة المغذاة على بذورالصويا (15 ملجم / جم دهن لبن) بالمقارنة بالكنترول (8.5 ملجم / جم دهن لبن).

أوضحت الدراسة أنه التغذية على البذور الزيتية أدت الى زيادة المحتوى من الاحماض الدهنيةفى اللبن وخصوصا الغير مشبعة وتقليل بسبة الاحماض الدهنية المشبعة فى دهن اللبن و مما سبق يتضح أنة أستخدام البذور الزيتية وخصوصا عباد الشمس فى علائق الماعز الحلابة أدى الى زيادة المحتوى من حامض اللينوليك المرتبط دون وجود تأثيرسلبى على صحة الماعز و كفاءتها الانتاجية.