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Effect of Nutrition on flaxseed Supplementation to Lactating Goats on Physiochemical and Nutritional Properties of Domiati Cheese in Halayeb, Shalateen and Abu Ramad Triangle of Egypt

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ABSTRACT

The purpose of this research was to evaluate the effect of feeding lactating goats with flaxseed on the physicochemical, sensory properties, yield, texture and fatty acids profile of Domiati cheese. Goat's milk resulted from goat feed different flaxseed levels (0, 7 and 14%) were used in the preparation of goat's Domiati cheese which was stored at 4±1ºC for 60 days. Results showed that supplementing flaxseed at level 7and 14% had significantly ($P < 0.05$) increased cheese protein, total solids and lactose, while no effect was observed on cheese fat. Cheese yield was significantly increased ($P < 0.5$) for cheese supplemented with 7 and 14%flaxseed than control cheese. Results also, showed in significant differences ($P<0.05$) on short- (SCFA) and medium-chain fatty acids (MCFA) .While a significant increase of mono -unsaturated (MUFA) and poly-unsaturated fatty acids (PUFA) in cheese fat were observed. Moreover, concentrations of conjugated linoleic acid (CLA) isomers and linolenic acid (C18:3) in cheese fat were increased linearly ($P < 0.05$) with the increase of flaxseed level. The concentration of CLA and C18:3 in cheese with7 and 14 % flaxseed concentrates significant ($P < 0.05$) increased. It was concluded that feeding flaxseed to lactating goats improved fatty acids profile in cheese as well as cheese yield. The texture profile parameters were significant ($P < 0.05$) decreased. Sensory properties scores were increased during storage period. Generally, resultant goat's Domiati cheese supplemented with 7 and 14% flaxseed were considered highly acceptable and it has many health benefits than the control cheese.

Keywords: Domiati cheese, flaxseed, goat's cheese, chemical composition, fatty acids

INTRODUCTION

World production of goat milk ranks third, below cow's and buffalo's milk, and is principally used to cheese manufacture (FAOSTAT 2014). In the last few years, goat and goat's milk production have enhanced by 55% which of goat's milk was 70%while goat's cheese manufacture was 17 (FAOSTAT 2019).There is an associate increasing demand for dairy farm product made up of goat's milk and has seemed to be thought of collectively of the sources of financial gain in several countries. There is associate increasing demand for dairy farm product made up of goat's milk and has been thought of collectively of the sources of financial gain in several countries because of the benefits enjoyed by goats and its products. The goat has the flexibility to adapt to the environmental conditions encompassing it and its product have several nutritionary and health properties (Silanikove *et al.*, 2010).

Goat's milk features a high biological value and better digestibleness because of its distinctive properties like larger protein micelles; casein profile is additional almost like human milk and smaller fat globules, additionally, it has good effect for health, physiological functions, within the nutrition of kids and elderly people, and might be appropriate for consumed by people suffering cow milk allergic reaction (Faye and Konuspayeva 2012).Milk productivity depends in the main on the amount and quality of feedstuffs (Aplocina and Spruzs 2012).

Goat cheese could be a kind of cheese that's ordinarily developed in goat milk-producing countries especially with a year-round tropical climate (Ribeiro and Ribeiro 2010). The event of goat as milk producer has been widely practiced as a result of the goat milk has benefits compared to cow milk. many benefits of goat milk are additional medium level of fatty acid chains, additional fatty globules with smaller diameter, and also the softer curd made from the goat milk, so it's best used as a raw material for cheese (Park and Haenlein 2013).

Flaxseed that is additionally called oilseed could be valuable herb happiness to the flax family. (*Linum usitatissimum*) is that the Latin name of flaxseed that brings the means of "very useful", and it consists of two basic varieties: golden or yellow and brown (Bernacchia *et al.*, 2014). It is believed to be originated from Egypt and has been cultivated worldwide for its oil and fiber dated back to several years ago (Kaithwas and Majumdar 2013).

Flaxseed is one among the oldest crops historically cultivated principally for its oil functions and wide illustrious for its wealthy supply of nutritive and bioactive compounds. Nowadays, it's gained extensive interest because of the potential health advantages attributed to its component of metabolites and antimicrobial activates. (Fadzir *et al.*, 2018).

Flaxseed has been studied extensively in diet and disease-related analysis because of its health advantages associated with high content of, lignans, fibre, proteins, cyclic peptides, polysaccharides, alkaloids,cyanogenic glycosides and phenolic compounds, (Shim *et al.*,2014 and Chauhan *et al.*, 2015).

Flaxseed contains a distinctive fatty acid profile. It's high in polyunsaturated fatty acids; alpha-linolenic acid (ALA) the essential omega-3 fatty acid and linoleic acid an

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omega-6 fatty acid and low in saturated fatty acids (Bernacchia *et al* 2014).

Recently, consumer's interest in healthy consumption shifted towards the potential health advantages of specific foods and food ingredients. Flaxseeds have a crisp and chewy texture and a pleasing, nutty taste, are utilized either as dietary supplement or as associate ingredient in prepared food; flaxseed has been the main focus of enhanced interest within the field of diet.(Bernacchia *et al*., 2014 and Elshehy *et al*.,2018).

Domiati cheese is considered as a part of culture of most Egyptian citizens, it's defined as the most vital white pickled cheese manufacture from cow's and buffalo's milk. The main step in its production is that the addition of (10 - 14%) salt on to cheese milk before renneting. The yield is very depending on the composition and season variation of milk production. The cheese is ready to consume at three months storage (semi ripened) or after six months storage (well ripened). Its production needs an enormous capital because of the high costs of milk and therefore the value of ripening. (Hamad2015).

Therefore, the current study was to investigate the effect of feeding lactating goats with different levels of flaxseed on the physicochemical, sensory properties, yield, texture and fatty acid profile of Domiati cheese during storage period at 4±1ºC for 60 days.

MATERIALS AND METHODS

Goat's milk (fat 3.4% and total solid 12.32%) obtained from the farm of Shalateen research station-desert research center, a locality in Ras-Hederba valley situated in Halaieb-Shalateen-Abou Ramad triangle, Red Sea Governorate, Egypt.

Animals and rations: Twenty lactating of native desert goats in their 1st and 2nd lactating seasons and a weight average at 27.9 ± 2.1 Kg with associate aged between 2-3 years old were randomly divided by single-factor randomized design equally into three equal groups. The experimental diets were developed to cover their nutritionary needs. The concentrate supplement mixture consists of 31% wheat bran, 26% cottonseed meal, 25% barley grain, 4%molasses, 2.5% limestone, 10% rice bran, 1% common salt, and 0.5% mineral and vitamins mix with the average of chemical composition and nutritious values of run dry matter (DM g/kg wet material) 94.50, Organic matter (OM) 91.00, Crude protein (CP) 17.38, Either extract (EE) 2.26, Neutral detergent fiber (NDF) 47.50, Acid detergent fiber (ADF) 14.50, Acid detergent lignin (ADL) 5.62 and Acid insoluble ash (AIA) 1.08%). The first group was served as a control, whereas the second and third experimental groups was enriched by partial replacement of concentrate supplement mixture by adding (7 and 14%) whole flaxseed (Linum usitatissimum L).

Sampling of milk: Milk samples were collected from animals all month during the expremental period (288days) during 2017-2018. The goats milked twice daily treated goat's milk was used in the manufacture of Domiati cheese.

Microbial rennet powder and yoghurt starter culture of *Lactobacillus delbrueckii* ssp *bulgaricus, Streptococcus thermophilus*, were obtained from Chr. Hansen's Lab., Copenhagen, Denmark. A commercial pure fine grade salt was obtained from El-Naser Company, Egypt. Calcium chloride was obtained from El-Gomhoria Co., Cairo, Egypt.

Domiati cheese manufacture:

Three batches of goat's Domiati cheese were prepared with some modifications according to (Abou-Donia 1986) with some modification as follow: Fresh goat's milk without flaxseed as a control and goat's milk with 7 and14% flaxseed were standardized to 3.4% fat. The three goat's milk were pasteurized at 72ºC for 15 seconds, then cooled to 42±1ºC salt (5 %) were added to all goat's milk batches then 2% yoghurt starter culture, 0.01% CaCl2 solution and liquid rennet (30 ml/100L.) were added to the salted milk at 40ºC for 4-5 h. after complete coagulation the cured from the three treatments were cut and transferred into rectangular stainless steel moulds and slightly pressed overnight. The resultant Domiati cheese from each treatment were weight and cut into cubes and stored at 4±1ºC for 60 days in plastic jars , filled with 10% boiled salt whey.

Physic-chemical analyses of milk and cheese:

Physic-chemical composition of goat's milk (protein, fat, lactose, ash , total solids contents (%) and specific gravity were analyzed in triplicate for each determination by using automatic analyzer Lactoscan milk analyzer, (Model Lactoscan SL, Milkotronic Ltd, Bulgaria) calibrated for goat milk. The pH of the samples was determined using a digital pH meter (model pH 211; Hanna Instruments).

The Physic-chemical composition of resultant Domiati cheese samples was analyzed for Moisture content according to the (AOAC 2012), fat contents were determined according to (AOAC 2012) by Rose-Gottlieb Method, (905.02).Titratable acidity was estimated according to (AOAC 2012),while pH values were determined using glass electrode pH meter (Model 810) Fisher Scientific according to (AOAC 2012). Salt contents were analyzed as described by Richardson, (1985). Total protein was determined by using semi micro Kjeldahl as described by (AOAC 2012).

Yield calculation of goat's Domiati cheese:

The actual yield of goat's Domiati cheese yields were calculated as a weight of cheese divided by weight of milk expressed as a percentage. (Shakeel *et al*., 2003).

Cheese yield = Weight of cheese/ Weight of cheese milk× 100. Recovery of components (protein, fat, and milk total solids) were calculated as the weight of the component in the cheese divided by the original weight of the component in the milk expressed as a percentage (Nelson *et al*., 2004).

Fatty acids Analysis of goat's Domiati cheese:

Fatty acids were extracted from cheese samples and transferred to methyl esters as descended by (AOAC 2007).

Texture profile analysis of goat's Domiati cheese:

Texture profile measurements of Domiati cheese samples were carried out according to (Bourne 2002).

Sensory characteristic of goat's Domiati cheese:

Sensory characteristic of fresh and stored goat's Domiati cheese were evaluated according to the scheme described by (Nelson and Trout 1981). 15 points for color and appearance, 35 points for body and 50 pints for the flavour .Cheeses are judged by a panel test of 10 members of Desert Research Center who had experience in soft cheese varieties.

Statistical analyses:

Experimental data were statistically analyzed by ANOVA for Complete Random Design (CRD) according to

SPSS package (SPSS v.20, 2012) at 0.05 level of significance different

RESULTS AND DISCUSSION

The physic- chemical composition of goat's milk used for Domiati cheese manufacture:

The physic- chemical composition data showed differences (P < 0.05) among the three groups of milk used in goat's Domiati cheese manufacture illustrated in Table 1. Results show that goat's milk groups supplemented with 4% flaxseed and 14% flaxseed recorded the highest values (P < 0.05) for, total solid, ash, solid not fat and lactose compared with control group. These results might due to the increase in the proportion of flaxseed in goat feed, which is characterized by high content of protein, ash and dietary fiber. These results agree with those reported by Herchi *et al.*, (2015).

Also, it can noticed that the goat's milk groups supplemented with 7 and 14% flaxseed showed in significant (P < 0.05) differences of milk fat compared with the control sample. The pH value recorded lowest value (P < 0.05) in all expremental milk. The changes in titratable acidity of all expremental groups followed an opposite trend to pH values. Similar values were reported by Abbas *et al.*, (2014) and Park *et al.*, (2007). Also results showed that non-significant differences (P<0.05) for the average of specific gravity between all expremental groups. These results were agreement with Alkanhal, (1993).

Table 1. The physic- chemical composition of goat's milk used for Domiati cheese manufacture.

Flaxseed supplementation (%)	Components (%)								pH values
	Total solids	Solids not fat	Fat	Protein	Ash	Lactose	acidity	Specific gravity	
0	12.32^{a} ±0.45	8.90^{b} ±0.18	3.42^{a} ±0.53	3.44^{b} ±0.12	0.87^{a} ±0.02	4.60^{b} ±0.04	0.16^{a} ±0.01	1.031^{a} ±0.01	6.73^{a} ±0.04
7	12.76^{a} ±0.32	9.28^{a} ±0.14	3.45^{a} ±0.11	3.77^{a} ±0.08	0.89^{a} ±0.04	4.66^{ab} ±0.11	0.18^{a} ±0.01	1.032^{a} ±0.01	6.69^{a} ±0.12
14	12.93^{a} ±0.19	9.39^{a} ±0.08	3.47^{a} ±0.23	3.79^{a} ±0.15	0.91^{a} ±0.01	4.77^{a} ±0.06	0.20^{a} ±0.01	1.034^{a} ±0.01	6.67^{a} ±0.09

Means within a row with different superscripts are significantly different (P<0.05).

Cheese yield and recovery of fat, protein and total solids % of goat's Domiati cheese:

Data presented in Table 2 show the yield of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed were significantly (P<0.05) higher with the increase the level of flaxseed addition. Fresh goat's Domiati cheese supplemented with 14%flaxseed recorded the highest yield. It were 20.47±0.51followed by goat's Domiati cheese supplemented with 7%flaxsed were19.50±0.44 while control cheese recorded the lowest yield it was 18.97±0.55. The yield of all expremental cheese were significantly (P<0.05) decreased gradually during storage period up to 60days. This may be attributed to loss of moisture during the storage period These results agree with those reported by Bermudez-Aguirre and Barbosa-Cánovas (2011).However The yield found in this study were lower than those obtained by Ismail and Osman (2004), who mentioned that the yield of Domiati cheese made from goat's milk was 26.11%.This higher yield in cheese dependent on milk composition, particularly fat and protein Guo *et al.*, (2004).

Table 2. Mean cheese yield and recovery of fat, protein and milk total solids % of Domiati cheese made from goat's milk supplemented with flaxseed during the storage period at 4±1°C for 60 days.

Properties (%)	Flaxseed supplementation (%)	Storage period (days)				Total main effects of feed Treatments
		Fresh	15	30	60	
Yield	0	18.97^{a}±0.55	18.64^{a}±0.31	17.85^{b}±0.27	17.19^{b}±0.21	18.16^{b}±0.79
	7	19.50^{a}±0.44	19.17^{a}±0.72	18.68^{a}±0.28	18.50^{a}±0.51	18.96^{a}±0.60
	14	20.47^{a}±0.51	19.46^{ab}±0.57	19.13^{b}±0.77	18.77^{b}±0.20	19.46^{a}±0.81
Fat Recovery	0	74.87^{a}±6.79	76.16^{a}±7.68	75.86^{a}±6.56	74.46^{a}±5.05	75.34^{b}±10.52
	7	76.52^{a}±4.04	78.35^{a}±4.76	79.26^{a}±5.50	83.66^{a}±5.47	79.45^{b}±5.06
	14	87.12^{a}±1.34	86.06^{a}±3.72	88.47^{a}±4.59	89.98^{a}±6.08	87.91^{a}±3.97
Protein Recovery	0	73.07^{a}±3.04	74.61^{a}±4.68	73.98^{a}±2.59	72.93^{a}±3.27	73.65^{b}±3.05
	7	70.27^{a}±4.64	71.51^{a}±3.31	71.21^{a}±3.46	76.06^{a}±3.05	72.26^{b}±4.53
	14	81.24^{a}±0.88	79.47^{a}±1.12	83.25^{a}±4.84	83.84^{a}±3.27	81.95^{a}±3.13
Solids Recovery	0	54.71^{a}±0.78	53.89^{a}±3.64	51.98^{a}±2.02	51.17^{a}±2.82	52.94^{c}±2.63
	7	55.68^{a}±4.54	56.25^{a}±3.42	54.90^{a}±5.86	57.50^{a}±0.76	56.08^{b}±3.63
	14	60.91^{a}±2.19	59.65^{a}±2.12	61.21^{a}±2.11	60.62^{a}±0.29	60.60^{a}±1.70

Means within a row with different superscripts are significantly different (P<0.05).

Also, data from Table 2 show that, protein recovery of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed were significantly (P<0.05) higher than the control cheese. Fresh goat's Domiati cheese supplemented with 14% flaxseed recorded the highest protein recovery which were 81.24±0.88 followed by goat's Domiati cheese supplemented with 7% flaxseed which were70.27±4.64, while control cheese recorded the lowest protein recovery % being73.07 ±3.04.Significant (P<0.05) increased in protein recovery of goat's Domiati cheeses made from milk supplemented with different levels of flaxseed during storage period up to 60days. These results agree with those found by Mahrous *et al.*, (2014).

Also, fat recovery of fresh goat's Domiati cheese supplemented with 7and 14% flaxseed were significantly (P<0.05) higher than the control cheese. The highest fat recovery was recorded in fresh goat's Domiati cheese supplemented with 14% followed by goat's Domiati cheese supplemented with 7% flaxseed, while control cheese recorded the lowest value. Significant (P<0.05) increased in fat recovery in all goat's Domiati during storage period up to 60days. These results were noticed were in harmony with those found by Zeng *et al.*, (2007)

On the other hand, the solids recovery % increased in all expremental cheese throughout the storage period with significant differences (P<0.05) between goat's Domiati

cheese supplemented with 7 and 14% flaxseed compared with control cheese as related to loss in cheese moisture content or might be due to the drainage of whey upon storage as affected by the effect of supplementation with 7 and 14% flaxseeds. From previous data it could be noticed that goat's Domiati cheese supplemented with 14% flaxseeds showed the highest effect on the cheese weight, yield, and fat, protein and total solids recovery%. Moreover, the goat's Domiati cheese supplemented with 14 5 flaxseed had highest values of solids recovery 60.91±2.19 followed by goat's Domiati cheese supplemented with 7% flaxseed compared with control cheese 54.71 ± 0.78. These results agreement with those reported by Zeng *et al.*, (2007).

The Physico-chemical properties of goat's Domiati cheese:

The Physico-chemical properties of Domiati cheese made from three groups of goat's milk supplemented with 0, 7 and 14% flaxseed during storage period at 4±1°C for 60days as moisture, Dry matter, protein/DM, fat /DM, salt /DM %, acidity and pH values were shown in Table 3.

Table 3. Physico-chemical properties of Domiati cheese made from goat's milk supplemented with flaxseed during the storage period at 4±1°C for 60 days.

properties (%)	Flaxseed supplementation (%)	Storage period (days)			
		Fresh	15	30	60
Moisture	0	64.45^{a}±1.39	63.15^{a}±2.80	62.88^{a}±1.99	62.05^{a}±2.45
	7	63.64^{a}±1.90	62.65^{a}±0.87	62.59^{a}±3.46	60.39^{a}±1.22
	14	61.78^{a}±1.23	60.94^{a}±0.96	59.23^{b}±0.31	58.84^{b}±0.64
Dry matter	0	35.55^{a}±1.39	36.85^{a}±2.80	37.12^{a}±1.99	37.95^{a}±2.45
	7	36.36^{a}±1.90	37.35^{a}±0.87	37.41^{a}±3.46	39.61^{a}±1.22
	14	38.22^{b}±1.23	39.06^{b}±0.96	40.77^{a}±0.31	41.16^{a}±0.64
Protein /DM	0	37.25^{c}±0.92	37.41^{c}±2.82	38.42^{c}±1.95	38.48^{c}±2.10
	7	37.56^{b}±1.96	37.75^{b}±0.80	38.82^{b}±3.95	39.32^{b}±1.28
	14	39.18^{a}±1.40	39.44^{a}±0.97	40.23^{a}±1.45	40.91^{a}±0.92
Fat/DM	0	37.46^{a}±1.76	38.33^{a}±3.39	38.51^{a}±1.91	38.93^{a}±2.54
	7	37.49^{a}±2.46	37.92^{a}±0.39	39.50^{a}±3.42	39.58^{a}±1.83
	14	38.49^{a}±1.72	39.10^{a}±1.03	39.16^{a}±1.13	40.19^{a}±1.91
Salt/ DM	0	14.43^{a}±0.21	14.46^{a}±0.18	14.74^{a}±0.35	14.99^{a}±0.29
	7	13.99^{a}±0.26	14.16^{a}±0.14	14.25^{a}±0.49	14.39^{a}±0.15
	14	12.93^{a}±0.19	13.12^{a}±0.35	13.26^{a}±0.57	13.39a±0.61
Titratable acidity	0	0.46^{d}±0.02	0.50^{c}±0.06	0.74^{b}±0.07	0.88^{a}±0.01
	7	0.44^{c}±0.10	0.46^{bc}±0.14	0.71^{ab}±0.01	0.82^{a}±0.01
	14	0.42^{d}±0.05	0.44^{c}±0.02	0.72^{b}±0.01	0.86^{a}±0.06
pH values	0	5.83^{c}±0.09	5.72^{b}±0.01	5.66^{c}±0.02	5.54^{d}±0.03
	7	5.90^{b}±0.02	5.92^{a}±0.10	5.76^{b}±0.05	5.66^{b}±0.05
	14	5.92^{a}±0.21	5.95^{ab}±0.06	5.78^{b}±0.10	5.68^{b}±0.13

Means within a row with different superscripts are significantly different (P<0.05).

The dry matter content of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed were slightly (P<0.05) higher than control cheese. The dry matter of fresh goat's Domiati cheese supplemented with7 and 14 % flaxseed were 36.36± 0.1.90 and 38.22±1.23 respectively, while control cheese was 35.55±1.39%. However, there were a significant (P<0.05) increase gradually in the dry matter content of all expremental cheese as the storage period was advanced to reach 39.61±1.22, 41.16±0.64 and37.95±2.45 % for goat's Domiati cheese supplemented with7 , 14 % flaxseed and control cheese , respectively after 60 days of storage. This might be due to the development of acidity which induces shrinkage in the cheese mass and exudation of moisture from cheese curd. These results are found by Hamad and Ismail (2012) and El-Zawahry (2018).

On the contrary, the moisture content of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed were slightly (P<0.05) lower than control cheese, due to a smooth structure, the moisture were 63.64±1.90, 61.78±1.23and 64.45 ±1.39 for goat's Domiati cheese supplemented with7 , 14 % flaxseed and control cheese , respectively. Significantly (P<0.05) decreased in the moisture content of all expremental cheese as the storage period advanced to reach 60.39±1.22, 58.84±0.64and 62.05±2.45 % for goat's Domiati cheese supplemented with7 , 14 % flaxseed and control cheese , respectively after 60 days of storage. These results agreement with those reported by Hamad and Ismail (2012).

The total protein contents (Protein /DM) of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed respectively, were significantly (P<0.05) higher than control cheese. Goat's Domiati cheese supplemented with 14 % flaxseed recorded the highest Protein /DM content, it were 39.18 ±1.40 followed by Domiati cheese supplemented with 7% flaxseed 37.56 ±1.96 than the control cheese37.25±0.92 it's may be due to the high protein content of milk produced from goats fed flaxseed. On the other hand, protein /DM of the goat's Domiati cheese supplemented with 14 and 7% flaxseed, respectively. Significantly (*P*<0.05) decreased during the storage period. This decrease is as a result of the loss of whey protein from the cheese into the pickle as well some protein hydrolysis these results in harmony with those found by Abou-Donia (1986).

Also, it could be noticed that in significant (P<0.05) differences in the fat content in dry matter (Fat /DM) of all expremental cheese, while at storage period progressed fat /DM increased gradually and reaching maximum values at the end of storage period up to 60 days for all expremental cheese . The gradual increase in the Fat /DM was due mainly to the progressive losses in the moisture content during storage. These results were agreement with those reported by Abou-Zeid *et al.*, (2007).

The salt content (Salt/DM) of fresh goat's Domiati cheese supplemented with 14 and 7% flaxseed were significant (P<0.05) lower than control cheese while, Salt/DM of all expremental cheese increased (P<0.05)

significantly during the storage period up to 60days. These results of salt content were in harmony with those obtained by Mehanna *et al*., (2002).

The pH values and Titratable acidity of fresh and stored goat's Domiati cheese supplemented with 7 and 14% flaxseed are illustrated in Table 3. The pH values of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed were significant (P<0.05) increased until day 30 of storage, after which it decreased slightly at the end of storage period up to 60 days with significant (P<0.05) differences between goat's Domiati cheeses supplemented with 7 and 14% flaxseed goat's Domiati cheeses. This gradual increased in pH values may be due to the inhibitory impact of omega-3 as a free fatty acid on the growth of starter culture Abd Elhamid (2017).On the other hand, the pH values of the control cheese sample decreased gradually during storage period up to 60 days.

The changes in titratable acidity of goat's Domiati cheese followed an opposite trend to pH values. Titratable acidity was significantly (P<0.05) increased up to the end of storage period with significant (P<0.05) differences between goat's Domiati cheeses supplemented with 7 and 14 % flaxseed compared with control cheese sample. The highest values of titratable acidity at the end of the storage period up to 60days due to the development of acidity during the storage period attributed to converting the residual lactose in cheese into lactic acid by the available micro-flora these results agree with those reported by Elewa *et al*. (2009)and Effat *et al*,. (2012).

Textural profile analysis (TPA) of goat's Domiati cheese:

Textural parameter changes are shown in Table 4 .Hardness and adhesiveness values of fresh goat's Domiati cheese supplemented with 7 and 14% flaxseed were significantly (P<0.05) lower than control cheese and were increased gradually during the storage period up to 60 days. These results could be attributed to the addition of flaxseed in goats feed which resulted high concentration of unsaturated fatty acid in milk fat led to the resulted cheese has softer texture also, hardness affected by other factors such as soluble nitrogen, pH values, fat, protein and moisture content. These results are in harmony with those reported by Bermudez-Aguirre & Barbosa-Cánovas (2011) and Abd Elhamid (2017).

Also, data from Table 4 shows the other texture parameters; cohesiveness, gumminess, springiness and chewiness of all expremental cheese which showed significantly ($0.0 \leq 0.05$) lower values with the increase of flaxseed supplementation compared with control cheese samples. The other all texture parameters of all expremental cheese increased significantly ($P \leq 0.05$) in all treatments during the storage period up to 60 days except for adhesiveness and springiness that were not significant, these may be due to the interaction between milk component especially (fat globules, casein micelles, calcium and omega 3 fatty acid). These results are in agreements with Bermudez-Aguirre & Barbosa-Cánovas (2011 & 2012) and Abd Elhamid (2017).

Table 4. Changes in textural profile of Domiati cheese made from goat's milk supplemented with flaxseed during the storage period at 4±1°C for 60 days.

Properties	Flaxseed Supplementation (%)	Storage period (days)			
		Fresh	15	30	60
Hardness (N)	0	7.20^{a}±0.61	5.30^{b}±0.50	5.10^{b}±0.50	4.90^{b}±0.50
	7	6.18^{a}±0.50	4.12^{b}±0.50	3.95^{b}±0.50	3.62^{b}±0.50
	14	4.39^{a}±0.50	2.99^{b}±0.50	2.78^{b}±0.50	2.39^{b}±0.50
Cohesiveness (J/m^3)	0	0.71^{a}±0.50	0.69^{a}±0.50	0.68^{a}±0.50	0.67^{a}±0.50
	7	0.53^{a}±0.50	0.49^{a}±0.48	0.49^{a}±0.47	0.49^{a}±0.46
	14	0.45^{a}±0.37	0.44^{a}±0.34	0.44^{a}±0.34	0.44^{a}±0.33
Gumminess(N)	0	4.80^{a}±0.50	2.70^{b}±0.50	2.56^{b}±0.50	2.40^{b}±0.50
	7	4.21^{a}±0.50	2.18^{b}±0.50	1.01^{bc}±0.50	1.86^{c}±0.50
	14	3.90^{a}±0.50	1.60^{Bb}±0.50	1.23^{b}±0.50	1.27^{b}±0.50
Adhesiveness (J/m^3)	0	-31.16^{a}±0.50	-31.34^{a}±0.50	-31.50^{a}±0.50	-32.00^{a}±0.50
	7	-29.47^{a}±0.50	-29.64^{a}±0.50	-29.92^{a}±0.50	-30.40^{a}±0.50
	14	-28.16^{a}±0.50	-28.34^{a}±0.50	-28.72^{a}±0.50	-29.10^{a}±0.50
Springiness	0	1.21^{a}±0.50	0.80^{a}±0.50	0.65^{a}±0.50	0.55^{a}±0.50
	7	1.06^{a}±0.50	0.76^{a}±0.50	0.57^{a}±0.50	0.49^{a}±0.46
	14	0.98^{a}±0.50	0.52^{a}±0.50	0.50^{a}±0.49	0.47^{a}±0.41
Chewiness(J)	0	1.09^{a}±0.55	1.04^{a}±0.50	1.00^{a}±0.50	0.97^{a}±0.52
	7	0.89^{a}±0.50	0.86^{a}±0.50	0.83^{a}±0.50	0.81^{a}±0.50
	14	0.82^{a}±0.50	0.79^{a}±0.50	0.77^{a}±0.50	0.75^{Aa}±0.50

Means within a row with different superscripts are significantly different (P<0.05).

Fatty acid composition of goat's Domiati cheese:

Fatty acid composition of Domiati cheese made from goat's milk supplemented with flaxseed was illustrated in Table 5. Results showed that in significant changes in cheese fat proportions of short-chain fatty acid (SCFA) concentration ($C_{4:0}$ and $C_{6:0}$) while significant ($P < 0.05$) decrease was observed in the saturated fatty acids fatty acid (SFA) of goat's Domiati cheese supplemented with 7 and 14 % flaxseed respectively compared to control cheese sample. These results are in harmony with those reported by Marín *et al*., (2012) they explained that no changes in milk fat from feeding lactating goat's on flaxseed especially in short chain fatty acid (SCFA). Also, it could be noticed that a significant ($P < 0.05$) increase in mono -poly unsaturated fatty acid (MUFA- PUFA) in cheese fat with the increase the level of flaxseed supplementation compared to the control cheese sample. These results due to the addition of flaxseed which rich in high proportions of α- Linolenic acid, Oleic acid, Linoleic and conjugated linoleic acid CLA, and a lower proportion of Palmitic acid to the goat's diets of resulted in increasing of unsaturated fatty acid UFAs in milk fat. These results are in agreement with those reported by Zhang *et al*.,

(2006).The α- linolenic acid in goat's Domiati cheese was increased from 0.454±0.005 to 0.473±0.004 % as the level of flaxseed was increased from 7 to 14 % than the control cheese sample which showed 0.334 ±0.005. Furthermore, the *de novo* FAs ($C_{4:0}$- $C_{16:0}$) in goat's Domiati cheese fat has been affected by flaxseed supplementation, the ∑*de novo* FAs were decreased with the increase of flaxseed level. It was 49.69±0.01 and 48.59±0.02 for 7 and 14 % flaxseed while in control cheese sample was 54.42±0.03 these results similar with those reported by Cívico *et al.*, (2017) as they observed that supplementing the diets of animals with PUFA rich oil sources (e.g., flaxseed) are typically associated with inhibits ∑*de novo* FAs ($C_{4:0}$-$C_{16:0}$) synthesis of milk fatty acids in the mammary gland by the inhibit or reduction enzyme in *de novo* lipogenesis synthesis pathways including palmitic acid in the mammary gland. On the other hand, the cheese contents of short-chain fatty acids did not differ significantly (P<0.05) between all the expremental cheeses it was 2.93±0.01, 2.96±0.01and 2.92 ±0.01, respectively. , these results were in agreement those found by Jóźwik *et al*., (2010) who reported that the addition of plant oil rich in the polyunsaturated fatty acids (PUFA) in the diet had no effect on the short-chain fatty acids content of goat milk. Significantly (P<0.05) decrease of medium-chain fatty acids (MUFA) were observed in the Domiati cheese supplemented with 7 and 14 % flaxseed 21.37±0.02 and 21.27± 0.02respectively, than in the control cheese sample 24.63±0.03. Similar results were reported by Lerch *et al.*, (2012) who explained that the addition of flaxseed supplements results in a reduction in medium-chain fatty acids concentration. Data also, from Table 5 showed significant (P<0.05) higher values of total medium-chain fatty acids and polyunsaturated fatty acids ratio in goat's Domiati cheese supplemented with 7 and 14% flaxseed 27.67 ±0.02 and 29.63 ±0.03 vs. 6.74± 0.01 and 7.56 ±0.02 compared to the control cheese sample (24.25 ±0.02 vs. 5.53± 0.01%), respectively. These results are in a harmony with those reported by Kholif *et al*., (2016) who found an increase in the MUFA, PUFA, and total UFA concentrations of milk fat and a decrease in SFA concentration when flaxseed supplements were used in goat fed.However, significantly (P<0.05) increase in the proportion of total conjugated linolenic acids (CLA) content was noticed to be 1.28 ±0.01 and 1.46±0.01% for goat's Domiati cheese supplemented with 7 and 14% flaxseed while the control cheese sample was 0.94 ±0.01. These results could be due to the increase in CLA content with the flaxseed addition to goat's diets. These results are in accordance to Chilliard *et al.*, (2001) and Bernard *et al.*, (2009) as they reported that increasing diet contents of oils rich in linoleic and linolenic acids is the main reason for increased milk content of CLA. From the point of view of nutrition, increasing CLA concentration in milk is an important issue because of its health benefits. On the other hand, results indicated that the content of omega-3 fatty acid was significantly (P<0.05) higher in goat's Domiati cheese supplemented with 7 and 14% flaxseed being 0.96± 0.01 and 1.04± 0.01 than the control cheese sample (0.61±0.01). Also, significantly (P<0.05) increase of omega-6 fatty acid concentrations in goat's Domiati cheese supplemented with 7 and 14% flaxseed was noticed to be 4.26 ±0.02 and 4.79± 0.02 while in control cheese sample was 3.76 ±0.01, respectively. An increase of omega-6 FAs and the increase of omega-3 FA led to a decrease of omega-6 FAs to omega-3 FAs ratio in treated goat's Domiati cheese 4.44 0.01 and 4.61 0.01 for 7 and 14% flaxseed while in control cheese sample was 6.17± 0.03.These results are in agreement with Abedi and Sahari (2014) and Kholif *et al.*, (2016) who reported that lowering in the ratio of omega-6/omega-3 and increasing omega-3 concentration is recommended because of its health and nutrition benefits. On the other hand, the Atherogenicity index (AI) was significantly (P<0.05) lower in goat's Domiati cheese supplemented with 7 and 14% flaxseed which were 1.79± 0.01 and 1.61± 0.03 than in control cheese sample which was 2.24± 0.01, it might be due to flaxseed supplementation on lactating goat diets decreased the Atherogenicity which attributed to the higher proportions of PUFA or trans FAs in animals fed with oil-supplemented diets. These results agree with those reported by Kholif *et al*., (2016). From the previous results, it can be noticed that it is possible to prepare the healthy and nutritious Domiati cheese from goat milk produced by feeding the goat on flaxseed. The resulted goat's Domiati cheese contains a high percentage of poly-unsaturated fatty acids especially conjugated linoleic acid and Omega-3 concentration which are characterized by their health and therapeutic properties and makes it more acceptable to the consumer.

Sensory characteristics of goat's Domiati cheese:

Results in Table 6 show the sensory characteristics score of goat's Domiati cheese of all treatment during the storage period at 4±1°C for 60 days. Total Scores indicated that fresh goat's Domiati cheese supplemented with 14 % flaxseed gained the highest acceptability which was 75.2±1.9 followed by Domiati cheese supplemented with 7% flaxseed which was 71.2±0.8 while the control cheese sample gained the lowest score being 71.2±1.9. The data obtained revealed that, the sensory characteristics of all goats' Domiati cheese samples were improved during storage period up to 60 days. These results agreed with those reported by Ismail *et al.*, (2010) and Abd Elhamid (2017).Significant (P<0.05) differences in taste & flavour and texture between the goat's Domiati cheese supplemented with 14 and 7% flaxseed were observed in compare with control cheese. Goats' Domiati cheese supplemented with 14% flaxseed recorded highest score for taste & flavour and body &texture which were 38.2 ±0.4 and27.0±2.1, respectively while control cheese recorded lowest score being 36.6±0.9 and 24.4±1.5, respectively. On the other hand, cold storage of goat's Domiati cheese had pronounced effects on body, texture and flavour of fresh goat's Domiati cheese and during storage period up to 60days. Goat's Domiati cheese supplemented with 14 and 7% flaxseed gained the higher scores for body and texture at the beginning of storage and after 60 days as compared with control cheese. The flavor of expremental cheese supplemented with 14 and 7% flaxseed had the highest total score compared to control cheese. This may be due to the high contents of the flaxseed which improved the flavor by masked the goaty flavor. Appearance e& color characteristics were not significantly affected for all experimental cheese samples during storage period. Generally supplementation with different level of flaxseed had a significant effect on the body & texture; taste & flavor and total score than control cheese. Moreover, goat's Domiati cheese supplemented with 14% flaxseed gained the highest score.

Table 5. Effects of flaxseed supplementation on fatty acid composition (g/100 g of fatty acids) of goat's milk Domiati cheese

Fatty acid	Name	Flaxseed supplementation (%)		
		0	7	14
C4:0	Butyric acid	1.65^{a}±0.01	1.65^{a}±0.01	1.67^{a}±0.01
C6:0	Caproic acid	1.27^{a}±0.01	1.28^{a}±0.01	1.29^{a}±0.01
C8:0	Caprylic acid	2.26^{b}±0.01	2.27^{ab}±0.01	2.29^{a}±0.01
CI0: 0	Capric acid	7.48^{a}±0.01	6.38^{b}±0.01	6.54^{c}±0.01
C11:0	Undecanoic acid	0.15^{a}±0.01	0.15^{a}±0.01	0.15^{a}±0.01
C12:0	Lauric acid	5.99^{a}±0.01	4.17^{b}±0.01	4.15^{b}±0.01
C14:0	Myristic acid	8.78^{a}±0.01	8.42^{b}±0.01	8.16^{c}±0.02
C15:0	Pentadecanoic acid	1.33^{a}±0.01	1.31^{a}±0.01	1.22^{b}±0.01
C16:0	Palmitic acid	25.55^{a}±1.10	24.09^{b}±1.10	23.15^{c}±1.10
C17:0	Margaric acid	1.00^{c}±0.01	1.38^{b}±0.04	1.80^{a}±0.01
C18:0	Stearic acid	11.96^{c}±0.02	10.68^{b}±0.01	10.19^{c}±0.01
C20:0	Arachidic acid	0.21^{a}±0.01	0.18^{b}±0.01	0.17^{b}±0.01
C22:0	Behenic acid	0.22^{a}±0.01	0.20^{ab}±0.01	0.19^{b}±0.01
C14:1 n5	myristoleic acid	0.12^{a}±0.01	0.12^{a}±0.01	0.13^{a}±0.01
C16:1	Palmitoleatic acid	1.09^{b}±0.01	1.13^{b}±0.03	1.22^{a}±0.01
C18:1 trans-9	Elaidic acid	1.36^{c}±0.01	1.46^{b}±0.01	1.55^{a}±0.01
C18:1 cis-9	Oleic acid	19.85^{c}±0.17	22.45^{b}±0.11	23.76^{a}±0.12
C18:1 trans-11	Vaccenic acid	0.72^{c}±0.03	1.23^{b}±0.02	1.53^{a}±0.01
C18:1 trans-7	Vaccenic acid	0.99^{c}±0.01	1.13^{b}±0.01	1.25^{a}±0.01
C20:l n5 cis-11	Eicosenoic	0.04^{b}±0.0001	0.06^{b}±0.0001	0.07^{a}±0.0001
C20:1 n7 Cis 9	Eicosaenoic acid	0.03^{a}±0.0001	0.03^{a}±0.0002	0.05^{a}±0.0001
C22:1 n9	Erucic acid	0.04^{b}±0.0002	0.05^{b}±0.0001	0.07^{a}±0.0001
C22:1 n11	Docosenoic acid	0.02^{b}±0.0001	0.03^{b}±0.0001	0.04^{a}±0.0001
C16:3	Hexagonic acid	0.172^{c}±0.003	0.191^{b}±0.001	0.225^{a}±0.007
C18:2 trans-6	Linolelaidic	2.135^{c}±0.007	2.355^{b}±0.007	2.425^{a}±0.007
C18:2 cis-6	Linoleic	1.145^{c}±0.007	1.355^{b}±0.007	1.760^{a}±0.014
C18:2 cis-9, trans-11	Rumenic acid conjugated linoleic acid CLA	0.820^{b}±0.028	1.085^{a}±0.021	1.115^{a}±0.007
C18:2 trans- 10, cis-12	Octadecadienoic acid conjugated linoleic acid CLA	0.122^{c}±0.003	0.192^{b}±0.003	0.312^{a}±0.003
CI8:3 n-3	α- Linolenic acid	0.334^{c}±0.005	0.454^{b}±0.005	0.473^{a}±0.004
C18:3 n-6	y- Linolenic acid	0.173^{c}±0.004	0.252^{b}±0.003	0.272^{a}±0.003
C18:4 n3	α- Octadecatetraenoic acid	0.213^{c}±0.004	0.353^{b}±0.004	0.384^{a}±0.005
C20:2 cis-11,14	Eicosadienoic	0.052^{c}±0.003	0.062^{b}±0.003	0.082^{a}±0.003
C20:3 n6	Dihomogammalinolenic acid	0.120^{c}±0.001	0.130^{b}±0.001	0.150^{a}±0.001
C20:3 n3 cis-11,14,17-	Eicosatrienoic	0.065^{c}±0.007	0.150^{b}±0.000	0.185^{a}±0.007
C20:4 n6	Arachidonic	0.180^{a}±0.001	0.160^{a}±0.001	0.180^{a}±0.001
∑SCSFA		2.92^{a}±0.01	2.93^{a}±0.01	2.96^{a}±0.01
∑ MCSFA		24.63^{a}±0.03	21.37^{b}±0.02	21.27^{b}±0.02
∑ LCSFA		40.25^{a}±0.25	37.82^{b}±0.23	36.71^{c}±0.21
∑ SFA		67.80^{a}±2.18	62.12^{b}±2.13	60.93^{c}±2.16
∑ MUSFA		24.25^{c}±0.02	27.67^{b}±0.02	29.63^{a}±0.03
∑ PUSFA		5.53^{c}±0.01	6.74^{b}±0.01	7.56^{a}±0.02
de novo FA (C4-C16)		54.42^{a}±0.03	49.69^{b}±0.01	48.59^{b}±0.02
Atherogenicity index (IA)		2.24^{a}±0.01	1.79^{b}±0.01	1.61^{c}±0.03
Total Omega ω-6		3.76^{b}±0.01	4.26^{a}±0.02	4.79^{a}±0.02
Total Omega ω-3		0.61^{b}±0.01	0.96^{a}±0.01	1.04^{a}±0.01
ω-6/ ω-3		6.17^{a}±0.03	4.44^{b}±0.01	4.61^{b}±0.01
Total CLA		0.94^{c}±0.01	1.28^{b}±0.01	1.43^{a}±0.01
∑ Total fatty acids		97.58±0.31	96.53±0.43	98.13±0.52
No identified		2.42±0.01	3.47±0.01	1.88±0.01

Means within a row with different superscripts are significantly different (P<0.05).

Omega ω-6= (C18:2 trans-6, C18:2 cis-6, C18:3 n-6, C20:3 n6 and C20:4 n6) ,Omega ω-3= (CI8:3 n-3, C18:4 n3 and C20:3 n3),SFA- saturated fatty acids ,MUFA – monounsaturated fatty acids,PUFA – polyunsaturated fatty acids, SCFA – short-chain fatty acids, MCFA – medium-chain fatty acids , LCFA – long-chain fatty acids, CLA=conjugated linolenic acids, The short-chain acids butyric (4:0) and Caproic (6:0).Medium-chain fatty acids (8:0–14:0), long chain fatty acids LCSFA (15:0–22:0)

Table 6. Sensory characteristics of Domiati cheese made from goat's milk supplemented with flaxseed during the storage period at 4±1°C for 60 days.

Properties (%)	Flaxseed Supplementation (%)	Storage period (days)				Total main effects of feed Treatments
		Fresh	15	30	60	
Appearance & color (15)	0	10.2^{a}±0.8	10.2^{a}±0.8	10.2^{a}±0.8	10.6^{a}±0.9	10.30^{a}±0.80
	7	10.4^{a}±0.5	10.8^{a}±0.8	11.0^{a}±0.7	10.8^{a}±0.8	10.75^{a}±0.72
	14	10.0^{a}±1.0	10.2^{a}±1.3	10.8^{a}±0.8	11.0^{a}±0.7	10.50^{a}±1.00
Body & text. (35)	0	24.4^{b}±1.5	26.4^{a}±1.1	26.4^{a}±0.5	27.2^{a}±0.4	26.10^{b}±1.41
	7	25.6^{c}±0.5	26.4^{bc}±1.5	27.6^{ab}±1.1	29.2^{a}±1.8	27.20^{b}±1.85
	14	27.0^{a}±2.1	27.8^{a}±2.2	28.4^{a}±1.3	28.8^{a}±1.6	28.00^{a}±1.84
Taste & Flavours (50)	0	36.6^{b}±0.9	37.6^{b}±0.9	37.6^{b}±0.9	39.2^{a}±1.3	37.75^{b}±1.33
	7	35.2^{b}±0.8	37.6^{a}±1.1	38.0^{a}±1.6	39.2^{a}±1.3	37.50^{b}±1.88
	14	38.2^{c}±0.4	41.0^{b}±0.7	41.4^{ab}±1.3	42.6^{a}±1.5	40.80^{a}±1.94
Total scores (100)	0	71.2^{c}±1.9	74.2^{b}±2.3	74.2^{b}±0.8	77.0^{a}±1.6	74.15^{b}±2.64
	7	71.2^{c}±0.8	74.8^{bc}±1.9	76.6^{ab}±2.6	79.2^{b}±3.6	75.45^{b}±3.73
	14	75.2^{c}±1.9	79.0^{b}±2.5	80.6^{ab}±1.8	82.4^{a}±1.7	79.30^{a}±3.29

Means within a row with different superscripts are significantly different (P<0.05).

CONCLUSION

The obtained results in this study confirmed the possibility to use goat's milk produced from goats fed on 7 and 14% flaxseed to manufacture Domiati cheese. This supplementation provides goat's Domiati cheese with nutritional and sensory values, without changing properties of the cheese. The resulted Domiati cheese had the highest content of unsaturated fatty acid ,omega -3 fatty acid and CLA fatty acid .there for , the use of 14% followed by 7% flaxseed as an alternative for improving the health benefits of goat's Domiati cheese.

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تأثير تغذية الماعز الحلابة ببذور الكتان على الخواص الفيزيوكيميائيه والتغذويه للجبن الدمياطي في مثلث (حلايب - شلاتين- أبو رماد) بمصر

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قسم تربية الحيوان والدواجن– شعبة الانتاج الحيوانى والدواجن – مركز بحوث الصحراء– القاهرة- مصر

الهدف من هذا البحث هو تقييم تأثير تغذية الماعز الحلابه على بذور الكتان على الخواص الفيزيائية والكيميائية والتغذويه للجبن الدمياطى حيث تم استخدام مستويات مختلفة من بذور الكتان (0 ، 7 و 14 ٪) فى تغذية الماعز وتم استخدام اللبن الناتج منها في تحضير جبن الماعز الدمياطي و الذى تم تخزينه على درجة حرارة 4 ±1 درجة مئوية لمدة 60 يومًا. أظهرت النتائج أن إضافة بذور الكتان الى عليقة الماعز بنسبة (7 و 14٪) زادت معنويا كلا من البروتين ، والمواد الصلبة الكلية واللاكتوز بالجبن الناتج ، بينما لم يلاحظ أي تأثير على نسبة الدهن.كما لوحظ ايضا زيادة معنويه فى محصول الجبن المصنع من اللبن الناتج من ماعز مغذاه على عليقه تحتوى على (7 و 14٪) من بذور الكتان بالمقارنه مع الجبن الدمياطى المقارن المصنع من لبن ماعز غير مغذاه على بذور الكتان. أظهرت النتائج أيضًا وجود اختلافات غير معنوية في الأحماض الدهنية قصيرة ومتوسطة السلسلة مع زيادة معنويه فى الاحماض الدهنيه غير المشبعة والأحماض الدهنية العديده الغير مشبعة في دهون الجبن الناتج . علاوة على ذلك ، لوحظ زيادة خطيه فى تركيز مشابهات حمض اللينوليك وحمض اللينولينيك في دهون الجبن كلمازادت نسبه بذور الكتان. مما سبق يتضح ان تغذية الماعز الحلابه على بذور الكتان ادت الى حدوث تحسن فى الأحماض الدهنية في الجبن الناتج.كذلك حدث انخفاض فى الخواص الريولوجيه. كما تحسنت الخصائص الحسية للجبن خلال فترة التخزين حيث تميز الجبن الناتج من لبن الماعز المغذاه على بذور الكتان بنعومه للقوام والتركيب و الملمس . بصفه عامة، اعتبرت الجبن الدمياطى الناتج من لبن ماعز مغذاه على العلائق المحتويه على (7 و 14 ٪) من بذور الكتان مقبولة للغاية وتتميز بالعديد من الفوائد الصحية أكثر من جبن المقارنه