J. Food and Dairy Sci., Mansoura Univ., Vol. 7 (2): 97 - 105 , 2016

MAKING KAREISH CHEESE WITH HIGH WITH ADDED SESAME HULLS

Howida A. El-Sayed; Meranda A. Tawfek and Zeinab A. Ali
Food Technology Research Institute, Agricultural Research Center, Giza, Egyp

ABSTRACT

Kareish cheese was made from skimed buffalo's milk fortified with 1%, 2%, 3%, 4% and 5% sesame hulls. Control cheese and their treatments were stored for three weeks at 5◦ respectively C. The chemical composition, microbiological and organoleptic properties were determined in cheese and its treatments weekly. The results showed that moisture and fat were decreased, protein, ash, fiber and vitamin A contents increased with increasing the amount of sesame hulls, while the pH value and soluble nitrogen (SN) decreased during the storage period. Microbiological, examination of kareish cheese, revealed that the total bacterial counts increased until second week, then decreased at the end period storage. However, moulds and yeasts were not detected during the first week then slightly detected at the end of storage period meanwhile, the coliforms were not detected. Kareish cheese containing 1%, 2%, 3%, 4% and 5% sesame hulls was acceptable and of good flavour, body and texture, appearance, while the most acceptable cheese treatments was cheese made by adding 1%-3% sesame hulls.

Generally, it could be recommended that the addition of sesame hulls between 1% and 2% in making kareish cheese can be applied.

INTRODUCTION

Kareish cheese is among the soft cheese, which is the most popular cheese in Egypt and Arabian Countries owing to its high protein, low fat and reasonable price. It is an acid coagulated fresh cheese made from skim milk with soft white curd, and it is slightly salty. Kareish cheese is considered one of the most food products rich in calcium and phosphorus. These elements are essential for bones and teeth formation. It is also rich in sodium and potassium, which play an important role in the formation of body liquids and muscles (Francois *et al*., (2004).

Increasing knowledge of the relationship between diet and health leads to new insights into the effects of food ingredients on physiological functions and health.

Johri *et al*., (1988) cited that sesame oil cake and soybean meal samples contained on average: crude protein 43.3 and 51.9% available lysine 1.12 and 4.13g/16gN methionine 2.7 and 1.76g/16g N, respectively. a single sample of meat meal contained 68.2% protein, available lysine 7.13 and methionine 3.14g/16 g N.

Sesame (*Sesamum indicum L*.) is an oilseed herbaceous crop of the *Pedaliaceae* family. (Elleuch *et al*., 2007; koca *et al*., 2007 and Wu, 2007). For example, of the world production of sesame seeds (3.7 million tons) in 2007, Asia and Africa produced 2.40 and 1.15 million tons accounting for 64% and 31% respectively, of the total seed supply (FAO, 2008). Sesame (*Sesmum indicum L*.) is recognized as one of the oldest crops in the world. Archeological records indicate that it has been used in India for more than 5000 years (Bedigian, 2004). The oil is very stable due to the presence of a number of antioxidants such as sesamin, sesamolin and sesamol (Suja *et al*., 2004). Therefore, it has along shelf life and can be blended with less stable vegetable oils to improve their stability and longevity (Chung *et al*., 2004 and Suja *et al*., 2004).

Sesame seeds was found to contain 13.5% of carbohydrate (Bedigian *et al*., 1985), 18-20% as total carbohydrates (Paredes-Lopez *et al*., 1994), 10-15% (Halliwell, 1997), 18.4% fresh weight base (FWB) in brown sesame seeds (Namiki *et al*., 1998), 6.3% in dehulled sesame seeds and 10% in whole sesame seeds (Ismael *et al.,* 2004), and 16.6%(Kimbonguila *et al.*,2010). Also, sesame (sesameum indicum L.) seed is one of the important oil seed crops in the world. It is not only a good source of edible oil, but also widely used in baked goods and confectionary products (Namiki, 1995 and Rababah, 1998).

Some strategies can be used in the cheese making process in order to improve the texture of low-fat cheeses, being one example the addition of microparticulated whey proteins as fat replacers (Hinrichs, 2001).

Sesame seeds are an excellent source of copper and calcium. It is rich in phosphorous, iron, mangnesium, manganese, zinc and vitamin B1. Many medical properties and health benefits of sesame may be attributed to its mildly laxative, emollient and demulcent (Anilakumar *et al.,* 2010).

Chemical composition of sesame shows that the seed is an importantsource of oil (50-60%), protein (18-25%), carbohydrates and ash (Sabah El Kher *et al.,* 2008). The oil fraction shows a remarkable stability to oxidation due to the presence of antioxidants (sesamol , sesamolin and sesamin) together with tocopherols. The quantity and quality of the oil contained in the seed have been shown to depend on ecological genetics and physiological factors such as climate, soil type, cultivars and maturity of plant respectively (Rahman *et al.,* 2007).

Therefore, the present workers as done in order to improve the quality and to increase the nutritional values of kareish cheese by supplanting the cheese milk used in making it with sesame hulls and to monitor the changes in cheese quality during storage period.

MATERIALS AND METHODS

Fresh buffalo's skim milk was obtained from the herd of Faculty of Agricultural, Cairo University. Sesame hulls were obtained from the Field Crops Research Institute, Agricultural Research Center, Giza, Egypt. Pure Yoghurt starter cultures of *Str. thermophilus* (EMCC1043) and *lactobacillus delbrueckii subsp. bulgaricus (EMCC1102)* were obtained from Cairo MIRCEN Culture Collection Center, Faculty of Agric., Ain Shams University. The used material (Zigiber powder) and sodium chloride was obtained from Giza local market.

Preparing of sesame hulls:

Heating sesame seeds was done without reaching to roasting degree, then sesame seeds were crushed to obtained (red Tehama), roistering to obtained sesame hulls by adding salted water gradually mechanically.

Buffalo's skim milk was heated to 85°C, then rapidly cooled to 42°C. Yoghurt starter culture was added at level of 2% to the base mixture for coagulation. The coagulated curd was separately transferred into gauze for wheying off during 24hr., cut and stored in its pasteurized salted whey (5% salt) for 24hr. The resultant cheese were analyzed when fresh and after 7, 14 and 21 days during storage in refrigerator (5±2◦C). Five replicates were examined in each treatment. The first portion was kept untreated and served as control, the seconds, third, fourth, and fifth were mixed with some sesame hulls.

Control=fresh buffalo's skim milk.
1%=1g sesame hulls + 99g buffalo's skim milk.
2%=2g sesame hulls + 98g buffalo's skim milk.
3%=3g sesame hulls + 97g buffalo's skim milk.
4%=4g sesame hulls + 96g buffalo's skim milk.
5%=5g sesame hulls + 95g buffalo's skim milk.

Kareish cheese was made as described by Effat *et al.,* (2001). The cheese were packed in plastic bags and stored at 5◦C for 21 days and analyzed at zero time, 7^{th}, 14^{th} day and 21^{th} day. The gross chemical composition of buffalo's skim milk and sesame hulls is shown in Table (1).

Table (1) :Chemical composition (%) of buffalo's skim milk and sesame hulls used in the manufacture of kareish cheese.

Ingredients	Buffalo's skim milk	Sesame hulls
Moisture	88.38	31.14
Fat	0.60	0.10
Protein	4.20	17.70
Lactose or Carbohydrate	5.06	47.85
Ash	0.980	3.210
Total phenols (as mg Gallic acid/100g)	0.00	2010.50
Total antioxidant activity (%)	34.00	69.50
Fiber	0.00	8.73
Either ext.	0.00	8.12

Fresh kareish samples were analyzed for titratable acidity and total solids (T.S) as described by Ling (1963). The pH value was measured by using pH meter type (HANNA pH meter, type 8417, Italy).The moisture, fat, protein, ash and fiber contents were determined as described in AOAC (2007).The mineral contents were determined by using the Atomic Absorption Spectrophotometer as described in AOAC (2007). Total volatile fatty acids (TVFA) value was determined according to Kosikowski (1982). Values were expressed as ml of 0.1 N NaOH/100g. Carbohydrate content was calculated by differences as follows: CHO= Total solids- (fat+protein+ash). The acid base titration of cheese samples and measurement of hysteresis loop was carried out the modified method of Kirchmeier (1979). Total phenols in kareish samples from different treatments were determined by folin-ciocalteau's reagent as described by Amous *et al.,* (2001). The antioxidant activity was determined by the 1,1-diphenyl-2-picryl-hydrazyl (DPPH) method of Brand-Williams *et al.,* (1995).

Amino acids other than tryptophan were determined with a "High Performance Amino acid-Analyzer" as described by Moore *et al.,* (1958) and Kirsten and Eggum (1966). Acid hydrolysis was performed in sealed ampule for the determination of all amino acids other than methionine, cystine and tryptophan. In the oxidized hydrolysis, methionine is determined as methionine sulphone, and cysteine is detected in the form of cysteic acid (Kirsten and Eggum, 1966). Samples were weighed (20-30 mg) in the ampules and 5 ml of 6 N HCl were added. Ampules were sealed under vacuum. Samples were heated in an oven at 110^{o}C for 24 h. The sealed ampules were then opened and hydrochloric acid was evaporated under vacuum. Sodium citrate buffer (pH 2.2) was used to dissolve samples and dilute it to the required volume. The filtered hydrolyzate was used for the amino acid analysis. Bechman High Performance Amino acid Analyzer system 7300 and Data system 7000 was used in which a sample of 50 µl. Volume was injected, using column Na-E/F/D 25 cm. The complete analysis took about 78 min. The level of amino acids could be calculated depending on the peaks obtained from the amino gram sheet.

Penetration depth was recorded in units of 0.1mm since penetrometer readings are inversely related to the firmness of cheese. Syneresis was determined according to the method of Dannenberg and Hessler (1988), with slight modification. Hundred grams of cheese in plastic cup was cut into four section and transferred into a funnel fitted with 120 mesh metal screen. The whey was drained into graduated cylinder. The amount of whey drained off was measured after 120 min at room temperature of cheese.

All samples were microbiologically examined after 24 hr., 7, 14 and 21 days for total colony count, coliforms, sporformers and yeast& moulds as described by APHA (1978).

The cheese was organoleptically assessed by 10 trained panelists for flavour (50), body and texture (35) and appearance (15) according to Nelson and Trout (1965) where the total score was 100 degrees.

The obtained results were statistically analyzed using a software package (SAS, 1991) based on analysis of variance. When F-test was significant, least significant difference (LSD) was calculated according to Duncan (1955) for the comparison between means. The data presented, in the tables, are the means (± standard deviation) of 3 experiments.

RESULTS AND DISCUSSION

The cheical composition of kareish cheese treatments fortified with different levels of sesame hulls during storage period are shown in Table (2). There were differences in moisture contents among all treatments including control treatment, which that contained the highest moisture with highest content of protein. The moisture, fat and soluble nitrogen content decreased while ash, protein and fiber increased the resultant cheese. The highest contents of protein, ash and fiber in cheese with sesame hulls are mainly due to the higher ratio in sesame hulls, compared to skim milk Table (1). These results are in agreement with those obtained by Osman *et al.,* (2000) and Ibrahim *et al.,* (1999). Kareish cheese made with sesame hulls higher vitamin (A). Control cheese without sesame hulls showed the lowest vitamin (A) content among all treatments. Increasing the ratio of sesame hulls added resulted in higher value of vitamin (A), being highest in 5% sesame hulls treatment. On the other hand, soluble nitrogen decreased in kareish cheese made from sesame hulls at different ratio. This might be due to the higher of sesame hulls in treated kareish cheese which caused higher protein decomposition than control Moneib *et al.,* (1981) and Hassanein (2003).

Table (2) : Chemical Composition (%) of kareish cheese treatments with added sesame hulls.

Cheese properties	Control	1%	2%	3%	4%	5%	LSD
Moisture	72.260^{a}	72.225^{ab}	71.785^{b}	71.169^{c}	70.635^{d}	70.205^{e}	0.0458
protein	21.900^{a}	21.495^{b}	21.500^{c}	21.601^{d}	21.710^{e}	21.820^{f}	0.0346
Fat	0.60^{b}	0.70^{c}	0.90^{d}	1.00^{c}	1.30^{b}	1.50^{a}	0.0324
Ash	4.190^{e}	4.230^{d}	4.280^{c}	4.330^{b}	4.350^{a}	4.370^{a}	0.0346
Fiber	0.00^{f}	0.070^{e}	0.130^{d}	0.170^{c}	0.210^{b}	0.250^{a}	0.0316
Soluble nitrogen	6.250^{a}	6.210^{b}	6.150^{c}	6.25^{a}	6.090^{d}	6.070^{d}	0.0346
Vitamin A(Iu)	0.10^{f}	0.100^{e}	0.170^{d}	0.280^{c}	0.370^{b}	0.460^{a}	0.0346

a, b, c: Means with same letter for same treatment during storage period are not significantly different.
Mixing: Control=fresh buffalo's skim milk.
1%=1g sesame hulls + 99g buffalo's skim milk. 2%=2g sesame hulls + 98g buffalo's skim milk.
3%=3g sesame hulls + 97g buffalo's skim milk. 4%=4g sesame hulls + 96g buffalo's skim milk.
5%=5g sesame hulls + 95g buffalo's skim milk.

Results also showed that the kareish cheese treatments exhibited were relatively of higher acidity than the control Table (3). During storage the acidity of all treatments increased, but the rat of acidity development was slower in cheese. Similar finding were reported by Elsissi and Abd-Ailah (1996). The trend of the changes in pH values of all treatments was opposite to that of acidity, which may led to more lactic acid production as a result of microorganisms metabolism Abd El-Salam *et al.,* (1988) and Abd–Allah *et al.,* (1993).

Table (3) : Changes in titratable acidity (%) and pH values of kareish cheese treatments with added sesame hulls when fresh and during storge period.

Storage period (days)	Control	1%	2%	3%	4%	5%	LSD
	Titratable acidity %(as lactic acid)						
Fresh	1.050^{Ab}	1.350^{Ab}	1.535^{Aab}	1.900^{Aab}	2.005^{Aab}	2.105^{Aab}	0.3442
7	2.050^{Ab}	2.060^{Ab}	2.055^{Ab}	2.130^{Ab}	2.155^{Ab}	2.430^{Aab}	0.1492
14	2.095^{Ca}	2.110^{Ca}	2.120^{Abc}	2.135^{Abc}	2.155^{Ab}	2.450^{Aab}	0.0367
21	2.160^{Ab}	2.125^{Ab}	2.135^{Ab}	2.150^{Ab}	2.170^{Ab}	2.490^{Aab}	0.0591
	pH value						
Fresh	4.985^{Aab}	4.965^{Aab}	4.960^{Aab}	4.950^{Ab}	4.935^{Acb}	4.910^{Ac}	0.0339
7	4.955^{Aab}	4.945^{Aab}	4.920^{Aab}	4.910^{Acb}	4.875^{AcD}	4.860^{Dab}	0.0418
14	4.945^{Aab}	4.925^{Aab}	4.905^{Aab}	4.900^{AaB}	4.870^{Acb}	4.825^{Abc}	0.0599
21	4.890^{Aab}	4.895^{Ca}	4.875^{Aab}	4.855^{Ab}	4.865^{Ab}	4.795^{Abc}	0.0212

A, B, C: Means with same letter among treatments in the same storage period are not significantly different.
a, b, c: Means with same letter for same treatment during storage period are not significantly different.
Mixing: Control=fresh buffalo's skim milk.
1%=1g sesame hulls + 99g buffalo's skim milk. 2%=2g sesame hulls + 98g buffalo's skim milk.
3%=3g sesame hulls + 97g buffalo's skim milk. 4%=4g sesame hulls + 96g buffalo's skim milk.
5%=5g sesame hulls + 95g buffalo's skim milk.

Treatments made with sesame hulls showed different mineral contents, compared to control Table (4). Adding sesame hulls to buffalo's skim milk was accompanied by high level of magnesium, potassium, iron and zinc in the resultant cheese, except for calcium, which was higher in control from the results in Table (4), it could also be noticed that the iron content of fortified kareish cheese with sesame hulls varied between 0.40-0.80 mg/100g, compared to 0.30 mg/100g in control treatment. These results are in agreement with reported by Ohba and Iio (2000), who stated that beverage prepared using sesame hulls had the same calcium contents milk with high level of iron (3-times than of milk). All elements were increased with increasing sesame hulls content in milk.

Table (4) : Mineral contents (mg/100g) of kareish cheese treatments with added sesame hulls when fresh and during storage period.

Minerals (mg/100g)	Treatments					
	control	1%	2%	3%	4%	5%
Na	66.00^{C}	66.05^{C}	66.10^{C}	66.15^{cb}	66.20^{b}	66.25
K	190.00^{b}	194.20^{b}	197.40^{ba}	202.46^{a}	205.67^{a}	208.88
Ca	320.00^{a}	327.18^{a}	334.35^{a}	343.22^{a}	350.39^{a}	357.56
P	110.00^{bc}	115.10^{bc}	119.20^{b}	124.35^{b}	128.45^{ba}	132.55
Mg	30.00^{CD}	32.60^{c}	34.20^{Cb}	35.95^{b}	37.55^{ba}	39.15
Fe	0.30^{D}	0.40^{DC}	0.50^{C}	0.60^{Cb}	0.70^{b}	0.90
Zn	0.32^{D}	0.40^{D}	0.49^{Dc}	0.57^{C}	0.66^{C}	0.74

See Table 2 for details.

The effect of different ratio of sesame hulls on total volatile fatty acid during the storage period on is shown in Table (5). Data indicated that there were slight differences p≤0.05 among kareish cheese treatments Table (5). Treatments with 1%, 2%, 3%, 4% and 5% sesame contained the highest TVFA, followed by increased content of sesame hulls. Total volatile fatty acid content increased significantly (p≤0.05) as storage period proceeded. This could be attributed to lipolysis activity of lactic acid bacteria. These results are in accordance with those reported by Nongonierma *et al.,* (2006).

Table (5) : Total volatile fatty acids (%) of set kareish cheese treatments with added sesame hulls when fresh and during storage period.

Storage period (days)	Treatments					
	control	1%	2%	3%	4%	5%
Fresh	0.33^{Ca}	0.36^{Cb}	0.40^{Ab}	0.60^{Ab}	0.66^{Ab}	0.70^{Ab}
7	0.35^{Ca}	0.39^{Cb}	0.46^{Cb}	0.60^{Ab}	0.69^{Ba}	0.75^{Ba}
14	0.39^{Ab}	0.43^{Ab}	0.50^{Ba}	0.62^{Ba}	0.72^{Aa}	0.80^{Aa}
21	0.41^{Ab}	0.49^{Ab}	0.55^{Ba}	0.64^{Aa}	0.76^{Aa}	0.85^{Aa}

See Table 2 for details.

The effect of different ratio different of sesame hulls on total amino acids on kareish cheese treatments is shown in Table (6). The distribution of total amino acids revealed TEAA (Lysine, Methionine, Cysteine, Threonine, Isoleucine, Leucine, Phenyl alanine and Valine) shows the Leucine amino acid highest than other amino acids. But Non-essential AA distribution to revealed (Histidine, Arginine, Serine, Glutamic acid, Aspartic acid, Glycine, Alanine and Proline) noticed the Glutamic acid highest than other amino acids development of cheese flavous is influenced by the nature and quantity of free amino acids Omar(2012).

Whey syneresis from kareish cheese with sesame hulls are presented in Table (7). All treatments showed lower firmness values than that of the control without sesame hulls. The syneresis decreased with increasing the ratio added of sesame hulls in the buffalo's skim milk. The decrease in firmness of treatments with sesame hulls could be due to the higher content of fiber in sesame hulls. The lowest penetration depth was recorded in control treatment, and the values increased in all treatments with sesame hulls being more pronounced in sample with 5% sesame hulls. These changes could be due to the differences occurred in fiber content of final product.

Table(6) : Amino acid composition (g/100g proteins) of kareish cheese treatments with added sesame hulls.

Amino acids (AA)	Concentration of sesame hulls Treatment					
	Control	**1%**	**2%**	**3%**	**4%**	**5%**
Essential AA :						
Lysine	6.76	7.36	7.49	4.83	7.24	6.46
Methionine	3.12	2.94	3.15	2.92	2.98	3.03
Cysteine	0.91	0.53	0.53	0.88	0.37	0.34
Threonine	4.50	4.29	3.42	4.51	4.07	3.57
Isoleucine	5.07	5.07	4.60	5.12	4.95	4.68
Leucine	9.41	8.56	8.80	9.46	8.43	8.61
Phenyl alanine	4.63	4.75	4.60	4.66	4.51	4.68
Valine	6.64	5.51	5.25	6.13	5.54	5.62
Tyrosine	ND	ND	ND	ND	ND	ND
Tryptophan	ND	ND	ND	ND	ND	ND
TEAA	41.04	39.01	37.84	38.51	38.09	36.99
Non-essential AA :						
Histidine	2.52	2.69	2.50	2.38	2.51	2.47
Arginine	2.97	3.01	2.89	2.77	2.74	2.81
Serine	5.66	4.97	4.73	5.25	4.88	4.36
Glutamic acid	21.19	20.47	21.67	21.53	21.07	22.85
Aspartic acid	7.19	8.28	6.91	7.01	5.69	6.13
Glycine	1.76	1.52	1.71	1.96	1.55	1.70
Alanine	3.38	2.81	2.83	3.24	2.59	2.74
Proline	10.17	12.85	13.00	10.25	13.75	13.96
TNEAA	54.83	56.60	56.24	54.39	54.78	57.02
TAA	95.88	95.61	94.08	92.90	92.87	94.01

ND : Not determined **See Table 2 for details.**
TEAA : Total essential amino acids (summed without tyrosine and tryptophan amino acids)
TNEAA : Total non-essential amino acids
TAA : Total amino acids (summed without tyrosine and tryptophan amino acids).

Table (7) : Changes in the firmness (penetration ,mm) and syneresis (ml/50g) of set kareish cheese treatments with added sesame hulls when fresh and during storage period.

Storage period (days)	Penetration (mm)					
	control	**1%**	**2%**	**3%**	**4%**	**5%**
Fresh	235^{Ab}	239^{Ab}	243^{Ab}	247^{Ab}	253^{Ab}	257^{Ab}
7	230^{Ab}	235^{Ab}	237^{Ac}	239^{Ab}	242^{Ab}	245^{Ab}
14	224^{Aa}	228^{Ab}	229^{Ac}	230^{Bc}	235^{Bc}	238^{Bc}
21	219^{Cb}	220^{Cb}	220^{Bd}	221^{Cd}	222^{Cd}	227^{Cd}
	Syneresis (ml/100g)					
Fresh	7^{Aa}	6^{Aa}	5^{Aa}	2^{Aa}	1^{Aa}	-
7	5^{Aa}	6^{Aa}	4^{Aa}	1^{Cd}	-	-
14	4^{Cc}	5^{Ca}	4^{Aa}	-	-	-
21	3^{Cd}	3^{Cd}	2^{Cd}	-	-	-

See Table2 for details.

Results given in Table (8) show that the total phenols and antioxidant activity (DPPH, free radical screening capacity) of kareish cheese without sesame hulls (control) exhibited low total phenols and total antioxidant activity, compared to treatments supplemented with sesame hulls. Sesame hulls can be considered as a rich natural material of the total phenols and total antioxidant. The increase in total phenols and total antioxidant were more pronounced as the level of sesame hulls increased. As can be seen from the data in Table (8). The total phenols and total antioxidant activity increased from 150.50mg/100g and 44.00% respectiveles for treatment without sesame hulls (control) up to 385.20mg/100g and 85.30% for treatment made with adding 5% sesame hulls. These results are a line with those of Olagunju and Ifesan (2013), who found increasing of inhibition percentage for sesame hulls.

Table (8) : Total phenols and total antioxidant activity of set kareish cheese treatments with added sesame hulls when fresh and during storage period.

Storage period (days)	Total phenols (as mg Gallic acid/100g)					
	control	**1%**	**2%**	**3%**	**4%**	**5%**
Fresh	150.50^{Ac}	280.30^{Ac}	312.20^{Cb}	325.50^{Cb}	350.30^{Ab}	385.20^{Ab}
21	68.30^{Cd}	76.10^{Dc}	79.50^{Cb}	82.40^{Cb}	86.60^{Ab}	90.80^{Ab}
	Total antioxidant activity (%)					
Fresh	44.00^{Dc}	69.50^{Cd}	70.00^{Cb}	82.10^{Cb}	85.08^{Aa}	85.30^{Aa}
21	44.90^{Cd}	69.80^{Cb}	70.30^{Cb}	82.42^{Ba}	85.40^{Aa}	85.78^{Aa}

See Table2 for details.

Results in Table (9) showed the total bacterial count in kareish cheese treatments. It could be observed that the total count of control 4%, 5% showed higher total bacterial, while they reached their maximum counts at 2 weeks of storage period, and decreased at the end of storage period. This decrease could be attributed to the developed acidity. These results are in agreement with those reported **by El-Soda and Saada (1986).**

Counts of yeast and mould recorded in kareish cheese treatments are presented in Table (9). It could be seen that the yeasts and moulds were not detected at zero time for all treatments. An increase in yeast and mould counts in control cheese was observed at the first week to three weeks. While, at highest concentration of sesame hulls 5%, the yeast and mould count were slightly increased in all treatments during storage period and this might be due to the acidity development and accumulation of lactic acid (Darwish *et al.,* 1989).

It could also be observed from Table (9) that either the control or the treated with sesame hulls kareish cheese were completely free from coliforms while fresh or during storage.

Table (9) : Microbiological analysis (log cfu/ml) of set kareish cheese treatments with added sesame hulls when fresh and during storage period.

Storage period (days)	Total Bacterial Count					
	control	**1%**	**2%**	**3%**	**4%**	**5%**
Fresh	7.69	7.90	7.93	7.95	7.97	7.99
7	7.50	7.95	7.98	8.00	8.02	8.04
14	7.30	8.00	8.01	8.02	8.05	8.08
21	7.10	7.83	7.87	7.89	7.90	7.92
	Yeast &Mold					
Fresh	ND	ND	ND	ND	ND	ND
7	3.79	3.82	3.99	4.01	4.10	4.30
14	3.94	4.00	4.20	4.31	4.44	4.62
21	4.50	4.38	4.51	4.62	4.69	4.81
	Coliform					
Fresh	ND	ND	ND	ND	ND	ND
7	ND	ND	ND	ND	ND	ND
14	ND	ND	ND	ND	ND	ND
21	ND	ND	ND	ND	ND	ND

See Table2 for details.
(cfu/ml) = Colony forming units/millitter.
ND: not detected

Sensory evaluation of kareish cheese made with sesame hulls is shown in Table (10). The flavour of resultant cheese enhanced and became more preferable to panelists with adding1%- 3% sesame hulls into buffalo's skim milk compared to the control. At 5% the panelists started to detect the flavour of sesame hulls in the product. The body and texture of resultant cheese were improved and the cheese showed more ability to spread with adding sesame hulls into buffalo's skim milk. Treatments with up to 1% - 3% sesame hulls was firm enough and body and texture with no defects was dectedel. While with higher sesame hulls ratios, the body started to be more firms which were more obvious with 5% sesame hulls. Addition of sesame hulls into buffalo's skim milk led to slight yellow colour of resultant cheese and this became more obvious with increasing the ratio added. Generally, the appearance of final product was affected by the ingredients used in manufacture of cheese. Total scores of kareish cheese indicated that all cheese treatments were acceptable but addition sesame hulls into skim milk up to 1% - 3% gave the best organoleptic quality compared to the control. Increasing the ratio of sesame hulls added above that affected significantly the quality attributes. Storage of cheese up to three weeks slightly lowered the total quality attributes and this effect was more marked in cheese samples at the end of storage period. These findings are in agreement with those of Awad (2006).

Table (10) : Sensory evaluation of kareish cheese treatments with added sesame hulls when fresh and during storage period.

Storage Period (days)	Treatments Control	1%	2%	3%	4%	5%	LSD
Appearance score (out of 15 points)							
Fresh	12.70^{ab}	12.80^{ab}	12.20^{ab}	12.50^{ab}	11.80^{Ab}	12.40^{ab}	0.8949
7	12.60^{cab}	13.20^{ab}	12.80^{ab}	12.30^{cdb}	11.80^{cd}	11.80^{Ad}	0.8602
14	12.40^{cb}	13.10^{ab}	13.30^{ab}	12.20^{cd}	11.80^{cd}	11.30^{Ad}	0.759
21	12.80^{ab}	12.50^{a}	12.70^{ac}	12.60^{ac}	12.50^{Aa}	12.80^{Aa}	0.5813
Body and texture score (out of 35 points)							
Fresh	29.70^{Ac}	32.20^{Aa}	30.30^{bc}	31.20^{Ab}	30.90^{Ab}	30.60^{bc}	0.924
7	29.60^{Ab}	31.40^{Aa}	31.50^{Aa}	31.20^{Aa}	30.70^{Aa}	29.50^{Ab}	1.046
14	29.90^{dc}	31.10^{Ab}	32.30^{Aa}	30.60^{bc}	29.80^{dc}	29.40^{Cd}	1.0084
21	30.30^{Ac}	30.70^{cb}	31.00^{cb}	32.20^{Aa}	30.40^{Dc}	31.50^{ab}	0.8688
Flavor score (out of 50 points)							
Fresh	44.80^{cD}	47.50^{Ba}	46.10^{cb}	45.50^{cD}	46.90^{ab}	44.20^{De}	0.9912
7	45.50^{cD}	47.20^{Ba}	46.20^{Aa}	45.20^{ab}	46.10^{Ca}	40.60^{Cb}	4.8077
14	45.60^{Ca}	46.90^{Ba}	47.00^{Aa}	40.70^{Ca}	44.60^{Ca}	40.60^{Aa}	6.7408
21	49.60^{Ac}	45.90^{Cb}	45.80^{Ab}	47.50^{Ca}	46.40^{Db}	45.50^{bc}	1.0084
Total score (out of 100 points)							
Fresh	84.90^{Dc}	90.80^{Aa}	86.10^{Dbc}	86.60^{bc}	87.40^{Ab}	84.20^{Da}	2.3463
7	84.90^{Ca}	89.90^{Ca}	88.00^{Ca}	86.10^{Aa}	85.80^{Aa}	78.40^{Ab}	5.898
14	85.00^{cab}	88.70^{ab}	90.50^{Aa}	81.10^{cd}	83.00^{cdb}	77.40^{Ad}	7.345
21	84.70^{Bc}	86.60^{bc}	87.10^{b}	90.40^{Aa}	86.40^{bc}	86.80^{Ab}	2.0336

See Table2 for details

CONCLUSION

Kareish cheese can be produced with adding sesame hulls up to 1% into buffalo's skim milk without any significant difference. Incorporation of sesame hulls into skim milk like cheese exhibited several nutritional advantages. Antioxidant and total phenols level were increased of liver functions and blood profile.

REFERENCES

A.O.A.C. (2007). Association of Official Analytical Chemists. Official Method of Analysis. (18th Ed.), pp. 302-850.Benjamin Franklin Station Washington, D.C., USA.

Abd – Allah S.A. M.; Abbas; N.H.El-sayed and N.F. Tawfik (1993). Effect of substitution of soymilk on some chemical properties, formation of biogenic camine and pr=toxiu of blue veined cheese. J. Agric. Sci. Mansoura Univ., 18(7): 2002-2010.

Abd el-Salam, M.H.; A.H. Dawood; S.M. Abd El-Hady; S. Abdou and E.A. Montasser (1988). Manufacture of blue veined cheese by ultrafiltration technique- Egyptian J. Dairy .Sci. 16:149-156.

Amous, A., Makris, D.P., and Kefalas, P., (2001). Effect of principal polyphenol components in relation to antioxidant characteristics of aged red wines. J. Agric. Food Chem. 49: 5736.

Anilakumar, K. R., Pal, A., Khanum, F., Bawa, A. S., (2010). Nutritional, medicinal and industrial uses of sesame (*Sesamum Indicum L.*) seeds – an overview. Agric. Conspec. Sci. 75 (4).

APHA. American public Health Association (1978). Standard methods for the examination of dairy products: microbiological and chemical 14th Ed. APHA. N.Y. USA.

Awad, S. (2006). Texture and flavor development in Ras cheese made from raw and pasteurized milk. Food Chem., 97:394.

Bedigian. D.; Sigler, D.S. and Harlan, J. R. (1985). Sesamin , sesamolin and the origin of sesame. Biochem. Syst. Ecol., 13(2): 133-139.

Bedigian, D. (2004). History and lore of sesame in Southwest Asia, Econ. Bot. 58:329-353.

Brand-Williams, W., Cuvelier, M. E., and Berset, C. (1995). Use of a free radical method to evaluate antioxidant activity. LWT- Food Sci. Technol. 28: 25.

Chung, J.; Lee, J. and Choe, E. (2004). Oxidative stability of soybean and sesame oil mixture during frying of flour dough. J. Food Sci., 69:574-578.

Dannenberg, F. and H.G. Hessler, (1988). Effect of denaturation of â-Lactoglobulin on texture properties of set-style nonfat yoghurt.1-syneresis. Milshwissenschaft, 43: 632-633.

Darwish, S.M., S.A.El-Deeb and R.I. Mashaty (1989). Effect of L. Helveticaus cell. Free extract at different salt concentration the acceleration rate of domiati cheese ripening . Egyptian J. Dairy Sci., 17:45.

Duncan, D. B. (1955). Multiple Range and Multiple F-test. Biometrics, 11.1- 42.

Effat, B.A.; M.M.E. salem and El-shafei(2001). Effect of using different starters on quality of kareish Egypt. Food Sci., 13: 29-108.

Elleuch, M.; Besbes, S.; Roiseux, O.; Blecker, C. and Attia, H. (2007). Quality characteristics of sesame seeds and by-products. Food Chemistry, 103:641-650.

El-sissi, M.G. and N.A. Abd Allah (1996). Effect of salting levels on ripening acceleration of comiati cheese . Egyptian J. Dairy Sci., 24:265-275.

El-Soda, M. and M. and Saada(1986). Accelerated ripening of Egyptian cheese varities a (review)Egyptian J. Dairy Sci., 14:115- 140.

FAO (2008). Food and Agricultural Organization (FAO) of the Unites Nations(2008).Database(http://faostar.fao.org/ste/567/DesktopDefault.aspx?pageID=567).

Francois Z. N., N. Ahmed, M.I. Felcite and M. El-soda (2004). Effect of ropy and capsular exoly saccharides producing strain of lactobacillus plantarum 162rm on characteristics and functionality of fermented milk and soft kareish type cheese. African J. Biotechnol., 3: 512-518.

Halliwell, B. (1997). Antioxidant and human disease: a general introduction. Nutrition Reviews, 55: S44-S52.

Hassanein, A.M. (2003). Study on use of soybean in manufacturing of yoghurt and cheese . PH.D. thesis, Fac., of Agric., Suez canal univ. Egypt.

Hinrichs, J., (2001). Incorporation of whey protein in cheese. International Dairy J. 11: 459-503.

Ibrahim, F.S.; A.M. Darwish and M.B.M. Mostafa (1999). Assessment the quality of reduced fat somiati cheese manufactured from skim milk powder fortified milk . Annals of Agric. Sci. Moshtohor, 31 (4) : 2589-2603.

Ismael, A. I. ; Amany, M. M. B. and Dalia, M. M. M. (2004). Effect of some processing on the quality of sesame oil and utilization of sesame hulls as natwral antioxidant. Egypt. J. Agric. Res., 82 (3) : 205 – 215.

johri, T.S.; Agrawal, R. and Sadagopan, V.R. (1988). Available lysine and methionine contents of some protenious feedstuffs. Indian Journal of Animal Nutrition. 5(3): 228-229.

Kimbonguila, A.; Nzikou, J.M.; Matos, I. ; lommomamou, B.; Nadangui, C.B.; pambou Tobi, N.P.G., Abena, A.A.; silom, Th.; Scher, J. and Desobry, S. (2010). Proximate composition od selected congo oil seeds and physicochemical properties of the oil extracts. Research J. Applied Sciences, Engineering and Technology, 2(1): 60-66.

Kirchmeier, O. (1979). Titrimetric studies on milk and milk products. J. Dairy Res. 46:397.

Kirsten, W. and B.O. Eggum (1966). Protein hydrolysis, a description of the method used at the department of animal physiology in Copenhagen. Acta Agriculture- Scandinavica, 16 : 115-119.

Koca, H., Bor, M.; Ozdemir, F. and Tukan, I. (2007). The effect of salt stress on lipid peroxidation, antioxidative enzyme and praline content of sesame cultivars. Environmental and Experimental Botany, 60 (3). 344 - 351.

Kosikowski, F. V. (1982). Cheese and Fermented Milk Foods. 2nd Ed. F. V. Kosikowski and Associates, Brooktonale, New York.

Ling, E. R. (1963). A Text Book of dairy Chemistry, Vol. 2 Practical 3rd ed. Chapman & Hall, Ltd., London.

Moneib, A.F.; A.Abo El-Heiba and A.F. Al-Khamy (1981). Picked soft cheese macking from whole and skim milk powder. Egyptian Dairy Sci., 9: 37-44.

Moore, S.; D.H. Spachman and W. Stein (1958). Chromatography of amino acid on sulphonated polystyrene resine. Anal. Chem. 30 : 1185-1190.

Nelson J.A. and G.M., Trout (1965). Iudging dairy product 4th Ed. The olseupublishing Co., mil waukeewis:53312.

Namiki, M. (1995). The chemistry and physiological functions of sesame. Food Reviews International, 11:281-329.

Namiki, M.; Ed. (1998). Goma, sono kagaku to kinousei (Advances in sesame science and function). Maruzen Planet Co. Tokyo. 268.p.

Nongonierma, A. B.; Springett, M.; euere, J. L. Le; Cayot, P. and Voilley, A. (2006). Flavor release at gas/matrix interfaces of stirred yoghurt models. Int. dairy J.; 16(2): 102-110.

Ohba, R. and M. Iio, (2000). Optimum conditions for making lactic acid by using broccoli powder, development of lactic acid beverage by using vegetable part I. J. Japanese Soc. Food Sci. Tech., 47(5): 384-389.

Olaqunju, A.I. and Ifesan , B.O.T. (2013). Changes in nutrient and antinutritinal contents of sesame seeds during fermentation . J. microbilo. Biotech. Food Sci. 2:2407.

Omar, M.M. (2012). Microstructure of semi hard type cheese made from reconstituted whole milk powder . Egyptian J. Dairy Sci., 40:45- 89.

Osman, S.G.; M.A. Zedan and M.F. Yonis (2000). softcheese like from soy milk . Egypt. Annals of Agric. Sci., Moshtohor. 38(1):379-388.

Paredes-Lopez, O., Guzman, M. S. H. and Ordorica, B. C. (1994). In Hudsin, B. J. Food Proteins from Emerging Seed Sources in New and Developing Sources of Food Proteins, p. 241 – 261. London : Elsevier Applied Sciences.

Rababah, T.M. (1998). Improvement of the quality of halawa tahina with special emphasis on the problem of oil separation . Master thesis, Jordan University, 65.p.

Rahman . M.S., Hossain, M.A., Ahmed G.M. Mddin, M.M., (2007). Studies on the characterization lipids and glyceride compositions of sesame (sesamum linn.) seed oil. Bangladesh J.Sci. Ind.Res. 42:67-74.

Sabah El-Khier, M.K., Khogali Elnuv, Ax. Abu El Gasim, A. Y., (2008). Chemical composition and oil characteristics of sesame seed cultivars grown in Sudan, Res. J. Agric. Biol. Sci. 4(6): 161-166.

SAS (1991) . SAS user's guide. Statistics. SAS Inst, Inc, Cary, NC. Berridge, N. J. (1952). Some observation on the determination of the activity of rennet. Analyst., 77:57.

Suja, K.P.; Abraham, J.T.; Thamizh, S.N.; Jayalekshmy, A. and Arumughan, C. (2004). Antioxidant efficacy of sesame cake extract in vegetable oil protection. Food Chem. 84:393-400.

Wu, W. H. (2007). The contents of lignans in commercial sesame oils of Taiwan and their changes during heating. Food Chemistry. 104 : 34 – 344.

تصنيع جبن قريش باضافة قشور السمسم

هويدا عبد الرازق السيد ، ميراندا عبد المجلي توفيق ، زينب عباس علي
معهد بحوث تكنولوجيا الأغذية – مركز البحوث الزراعية – جيزة - مصر

تم تصنيع الجبن القريش من اللبن الجاموسي المنزوع الدسم والمدعم بقشور السمسم بنسب ١% ، ٢%،٣%،٤%،٥% وتم التخزين لمدة ثلاثة اسابيع علي درجة ٥°م مع تقدير التركيب الكيماوي و الميكروبيولوجي و الصفات الحسيه اسبوعيا اوضحت النتائج انه بزيادة نسبة قشور السمسم الي اللبن الجاموسي المنزوع الدسم يحدث انخفاض في الرطوبه و نسبة الدهن بينما حدث زياده في الرماد ، البروتين ، فيتامينA و الحموضه و انخفاض في النيتروجين الذائب ،pH و الملح اثناء فترة التخذين.

ادي التدعيم بقشور السمسم الي زيادة الفينولات الكليه بزيادة نسبة اضافة قشور السمسم وتقل بالتخزين بينما مضادات الاكسده تزيد بزيادة نسب الاضافه وتزيد بالتخزين. واوضحت نتائج الدراسه الميكروبيولوجيه ان العدد الكلي للبكتريا يزداد بزيادة نسب الاضافه حتي الاسبوع الثاني ثم انخفاض حتي نهاية التخزين. وعدم وجود الكوليفورم خلال فترة التخزين اما الفطريات والخمائر لا تظهر خلال بداية التخزين(الطازجه) ثم تظهر قليلا حتي نهاية فترة التخزين واوضحت النتائج ان كل العينات كانت مقبوله حسيا الا انه اكثر العينات قبولا كانت تلك المعامله المصنعه باضافة ١%-٣% من قشور السمسم.