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The Benefit of Low Fat Buffalo Milk and Potassium Salt in Production of Some Kinds of Cheese.

A. J. AL-Mosway*.

Assist. Prof, Dept. of Food Science- Collage of Agriculture - Baghdad University, Iraq.

ABSTRACT

In this study, low fat buffalo milk produced from local cream production and potassium salt instead of sodium salt were used for production of two kinds of cheese that were the soft white Iraqi cheese and low energy Haloum cheese and these cheeses may be used for persons who have hypertension symptoms. The low fat buffalo milk structure was organized by adding 3% of full-fat dried milk for organization fat and protein ratios in the milk to 2.11 and 2.9% respectively, then six treatments of the soft white cheese were used, They were T1, T2, T3, T4, and T5 represented using 2% KCl , 1/1 ratio of KCl / NaCl , 2%-NaCl , immersing cheese mold in 5% -KCl solution and immersing cheese mold in 5% -NaCl respectively and there was a T6 treatment represented cheese produced from cow milk (control treatment). Four treatments of Haloum cheese were selected , they were H1 and H2 treatments which were saved in 5% and 10% of KCl solutions respectively , while H3 and H4 treatments were saved in 5% and 10% of NaCl solutions respectively, The results showed that both of the soft white cheese and Haloum cheese which were produced from this milk had good quality and there were non-significant differences in all the studied properties among the produced cheese treatments such as ADV, SN, microbial properties and sensory properties that reached 1.06 meq. 100 g^{-1} fat , 1.65 meq. 100 g^{-1} fat , 0.65% and 0.675% respectively. Microorganism counts development was less in cheese treatment that was saved in the saline solutions, and KCl solution was the best in this side and for both of the two cheese kinds. The soft white cheese and haloum cheese had good sensory properties that made them accepted by the evaluators .

Keywords: low fat milk, potassium, cheese, buffalo.

Corresponding author

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INTRODUCTION

Adding salt is considered as an important step in cheeses production in all of their kinds and it is considered as an important factor of giving the desired taste beside its role in saving the product from microorganism action. Three methods are used for cheese salinization, the first is the immersing method as in Haloum cheese production, the second is spreading and rubbing the salt on the surface of cheese mold as in Cheddar cheese production and the third method is adding salt to the thrombus after removing of the Whey as it is used with Cheddar kind and many of another kinds such as soft halved dried and dried cheeses. The known and common way is using NaCl salt in production of different cheeses and it improves the sensory properties of cheeses by giving them the desired taste and decreasing or preventing of bitter taste appearance and it equalizes the sweet taste (Guinee, 2004, Bintsis , 2006; Johnson et al, 2009)

The factors that limit the salty tastes acceptance are not understandable and it is believed that the environmental factors and the usual nutrition system plays important role in that. Nevertheless, there are weaknesses on sodium as its overmuch use is connected with increase of blood pressure which is one of the main reasons of cardiovascular diseases (Salahdeen and Alada, 2007; Marphy et al , 2012). The estimates refers to that 62% of the brain attack and 49% of the coronary heart diseases resulted from hypertension besides many of other negative health problems. In the highly developed industrial countries , sodium consumption may be more than 5 to 6 times of the maximum daily recommended amount (WHO ,2010). Source of this increase in sodium is from the manufactured foods as various dairy products especially the different kinds of cheeses that are considered a high levels fat and sodium materials (Ali and Abdel- Razig, 2011; Salih et al, 2011). In this matter, studies mentioned that decrease of 15% of the worldly consumption of sodium chloride amount for 10 years resulted 8.5 million death case related with cardiovascular diseases. One out of the ideal solutions to get rid of sodium is use of some of the alternatives as potassium chloride, calcium chloride and magnesium chloride (Grummer et al , 2013), these alternatives are usefull to body not such as sodium chloride and that encourages to their uses to enhance salt taste in many of food products, in the other side, these alternatives may cause presence undesired tastes especially the bitter taste, but the nutrition advantage in these alternatives makes them preferable. Replace of sodium chloride by potassium chloride is more common due to its negative effect on microorganisms as sodium chloride effect besides symmetry of the chemical and physical properties of food products (He and Macgregor, 2011).

Potassium advantage is a decrease of the high blood pressure because it works on getting rid of the body from sodium salts and this declines the opportunities of cardiovascular diseases infections such as atherosclerosis, and beside its role on supplying energy to body and decreases fatigue, general tired and muscles weakness, and also its role in bones strengthen as it improves of mineral absorption by bones, presence of potassium protects and decreases of probability of kidney and urinary tracts stones formation (Doyle and Glass, 2010; He and MacGregor, 2008).

Potassium chloride (KCl) has been recognized as a potential salt to substitute NaCl (Petik, 1987). A mixture of NaCl and KCl has been successfully used in various cheeses without any adverse effects on cheese quality (Reddy and Marth, 1991), including Halloumi cheese (Ayyash and Shah, 2010), Kefalograviera cheese (Katsiari et al., 1997, 2000), and Cheddar cheese (Katsiari et al., 2001), however, no information is available on low-fat Iraqi white soft cheese.

The local Iraq cream is one of the famous and desired milk products in Iraq , when it is manufactured the cream layer is removed and put in a refrigerator for the next day for consumption or sale. The rest of the manufactured milk (non-fatty milk) in the dishes may be sold as skimmed milk or may be used in thrombus yogurt production or this product may be put in one meter diameter white piece of cloth and then it is hanged up with forcing weight to get rid of water, this operation may last for 3 hours, and after removing the weights and the piece of cloth, collar of cheese may be got that known as Dulama and it may chopped as required. The aim of this study is production of local cheeses which have little effect on consumers health by using the low fat buffalo milk that resulted from Iraqi cream production which is unsuitable to product many of cheeses and has limited nutrition uses and, salinization the produced cheeses by using potassium salts for production of free or low sodium salts ratio cheeses.

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MATERIALS AND METHODS

First : preparing of cheese treatments:

Soft white Iraqi cheese production :-

Production operation of the soft white cheese was done by using the low fat buffalo milk (it was bought from Baghdad city local markets), then its structure was organized by adding 3% full fat dried milk (Almudhish type) which was also bought from local markets. The milk was pasteurized at 63°C / 30 min. and then cooled to 34°C in order to add the microbial rennet Mucor Mahi (that was produced by Japanese Meito Sangyo Co. LTD) and after cared formation, it was cut by using long and cross knives to get thrombus cubes which were left for 5 minutes and then shaken for another 5 minutes to drained all of the Whey completely, the resulted cared was used in preparation of five soft cheese treatments and using one kilogram cheese sample in each treatment as they are shown in the following table .

Treatment	Kind and method of salt application
T1	2%- KCl salt was added to the cared.
T2	2% of KCl and NaCl salts mixture was added to the cared in 1:1 ratio.
T3	2%- NaCl salt was added to the cared and it was considered as positive control treatment.
T4	5% - KCl saline solution was used.
T5	5%- NaCl saline solution was used and it was considered negative control treatment.
T6	2%- NaCl salt was added to the cared was made from cow milk and it was considered as negative control treatment

The production process was finished by packaging the salted thrombus of T1 , T2 and T3 treatments in stainless-steel molds and pressed and stored in a refrigerator to the next day, the cheese mold was put after expulsion in plastic containers. The same last procedure was repeated on T4 and T5 treatments but without dried salt addition to the thrombus after putting the press process, the cheese mold was uploaded and put in plastic containers and then the saline solutions were added to them (the chosen used concentration was selected after doing many elementary experiments by using many of KCl concentrations, 1% , 2.5% ,5% and 10%) and all the treatments were kept at a refrigerator till the time of tests. The sixth treatment T6 was done by using cow milk and the same last procedure was done and NaCl was applied to the thrombus before pressing this treatment which was considered as positive control treatment.

Haloum cheese production

It was produced by following the procedure that put by Ali et al (2010) The treatments were as follow:

- First treatment (H1) : The produced Haloum cheese slides were put in saline Whey solution prepared by adding 5% - KCl and kept in a refrigerator for tests.
- Second treatment (H2) : The saline Whey solution which was prepared by using 10% KCl was used.
- Third treatment (H3): The saline Whey solution which was prepared by using 5%NaCl was used.
- Fourth treatment (H4): The Whey solution contained 10% sodium chloride was added to salt Haloum cheese.
- Fifth treatment : Haloum cheese was manufactured here by using cow milk and cheese slides were put in the Whey solution contained 10% NaCl (control treatment).

Tests: All the tests were done on the white soft cheese at ages 1 , 3 , 5 , 7 ,10 days, while in Haloum cheese treatments, the tests were done at ages 1, 7, 14, 21, and 30 day of cooled storage at a refrigerator temperature (6±2° C). These tests were as follow.

Chemical tests: They were done on the used milk by using Milko tester instrument (Type Milk ANA yesr, Germany origin). While in cheese , the total acidity as lactic acid was measured by titration with 0.1N sodium hydroxide according to AOAC (2007), cheese pH was measured by pH- meter according to Papaionnou et al (2007), the percentage of moisture by Joslyn et al (1970) method that modified by Egan et al (1985), the fat percentage determination was done by method of Babkok according to Eckles et al (1997) and protein

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percentage by kjeldhal method (A0AC, 2002)and cheese sample fat acidity according the method mentioned by Fitz- Greald and Deeth (1976) that was Bureau of dairy industry (BDI) method, while the soluble nitrogen was determined by the way of Ling (1956) and modified by Al- Awad(1977).

Microbial tests: The total count of Bacteria, Coliform and Yeasts and Molds were determined by using the standard way that mentioned by Wehr and Frank (2004) by taking 12 gram cheese sample and mix it with 180 gram distilled water to get of a homogenized mixture that may be diluted to the desired dilution for the required tests. The pour- plate method was used by using nutrient agar (NG) provided by Oxoid company for total bacterial count determination, in which the plates were incubated at 7°C for 10 days. By the same last method, coliform group counts were determined by using MacConkey medium after incubation for 48 hours at 37°C, while Yeasts and Molds counts were estimated by using the solid nutrient medium (potato dextrose agar) after incubation for 5 days at 25°C .

Sensory evaluation: The sensory tests of the Haloum and the soft cheeses were done according to a questionnaire items that mentioned by Larmond (1987). The sensory evaluation groups included some of the specialized staffs of food sciences Department, College of Agriculture, University of Baghdad, besides some peoples who were chosen at random way at different groups and ages.

The statistical analysis: The data was statistically analyzed by the completely randomized design (CRD) and using SAS (2004) program.

RESULTS AND DISCUSSIONS

The chemical composition of milk: Table (1) shows the results of the chemical tests of the kinds of milk that used in preparation of cheese treatments .

Table 1: percentages of the compositions of the used milk in cheese treatments production

milk type	SNF%	pH	water%	Fat%	Protein%	lactose%
Low buffalo milk	5.81	5.9	83	1.04	2.12	3.19
buffalo milk standar compound	7.90	6.03	82	2.11	2.90	4.34
Cow milk	8.5	6.62	87	3.4	3.2	4.80

The soft white Iraqi cheese: Table(2) shows ratios of the chemical components of the soft white cheese , it may noticed non-significant differences in the studied components ratios in all the produced treatments from low fat buffalo milk, the determined titrated acidity ratios were between 0.20-0.32%, 6.2-6.4 and 28.2-28.3% respectively in all the treatments, while percentages of fat and salt were 15% and 2% respectively. Presence of such results may be due to that T1 to T5 cheese treatments were produced from the same thrombus which were divided into five treatments and to each treatment salt was added at the specified ratio and method and then they were kept at a refrigerators to study their different properties, the buffalo cheese treatments differed significantly compared with cow milk cheese treatments in moisture and fat properties and this may be due to the kind of the used milk and the rest properties did not differ between them.

Table 2: The chemical tests results of the soft white cheese.

treatment						
	Acidity%	pH	Moisture%	Fat%	Protein%	Salt%
T1	0.20	6.5	64	5	28.3	2
T2	0.20	6.5	64	5	28.5	2
T3	0.21	6.5	65	5	28.4	2
T4	0.20	6.5	63	5	28.3	2
T4	0.21	6.5	64	5	28.4	2
T5	0.223	6.3	57	15	25	1.7
T6	0.20	6.5	64	5	28.3	2
LSD	**0.088 NS**	**0.524 NS**	***6.27**	***3.402**	***2.166**	**0.44 NS**

*Readings represent the average of two replicate.
*The readings was recorded after one day of production.

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Fatty analysis was done by determination of acid degree value (ADV) of fat in (meq.100 gm^{-1} fat) unit , and the proteins analysis degree was also known according to the soluble nitrogen percentage (%) in all the studied soft cheese treatments and as they are shown in table (2 and 3), the results show that the ADV value ranged between 0.24 and 0.27 at one day age of the cooled storage and with advance of the storage time, clear improvement was obtained in ADV values which increased with age of the treatments till 14 day age to reach to 122, 1.38 , 1.65, 1.06, 1.11 and 1.31 meq.100gm^{-1} fat in T1, T2, T3, T4 and T5 respectively. The cause of this development in ADV values with storage times may be due to the role and activity of lipase enzyme on cheese fat(Park,2000 ; Turkogl,2011).The results show also that the developments in ADV value was less in the cheese treatments that were kept in the saline solution when salt was added to the thrombus before press operation (table 2).

It may be noticed when reading the results in table (3) , increase of soluble nitrogen percentage in all the treatments with advance of storage time , this increase was more in cheese treatments that subjected to dry salinization method compared with the treatments that were stored in the saline solutions, the variations in protein analysis in the stored soft cheese may be due to the chymosin enzymes and the protein analyzed bacterial enzymes with the physiochemical condition of cheese (Moatsou and Govaris, 2011). The results show non- significant differences between the produced treatments from fats distractive changed structure buffalo milk and the cow milk produced cheese treatments during the cooled storage time that lasted for 14 days . The high saline content and storage in saline solution are considered the reason of decrease of fatty and protein decomposition levels or be at lowest levels and quality and structure of saline solution are the sensitive points of cheese stability during storage (Ahmed, et al , 2014). When reading of these results was done , it may be found that replace sodium salt by potassium salt had no significant effect in decrease on increase the studied soft cheese.

Table 3: Results of the fat acidity of soft white cheese treatments that determined by measuring the ADV during the time of cooled storage (6±2 C) for 14 days

treatment	ADV (mlq/100gm fat)					
	1	3	5	7	10	14
T1	0.27	0.28	0.31	0.37	0.73	1.22
T2	0.25	0.27	0.31	0.36	0.81	1.38
T3	0.27	0.28	0.32	0.38	0.77	1.65
T4	0.24	0.26	0.30	0.35	0.66	1.06
T5	0.27	0.27	0.32	0.35	0.70	1.11
T6	0.23	0.24	0.28	0.33	0.56	1.31
LSD	0.067 NS	0.072 NS	0.103 NS	0.077 NS	*0.179	*0.209

Table 4: Results of the protein decomposition of soft white cheese treatments that determined by measuring the soluble nitrogen during the time of cooled storage (6±2 C) for 14 days.

treatment	Soluble nitrogen %					
	1	3	5	7	10	14
T1	0.121	0.130	0.192	0.202	0.321	0.675
T2	0.120	0.124	0.175	0.198	0.341	0.663
T3	0.121	0.123	0.181	0.211	0.325	0.725
T4	0.124	0.121	0.164	0.204	0.262	0.512
T5	0.122	0.124	0.162	0.197	0.249	0.516
T6	0.120	0.123	0.188	0.193	0.266	0.650
LSD	0.072 NS	0.006 NS	0.114 NS	0.133 NS	0141 NS	0.127 NS

The microbiological tests of the soft white cheese were done and the results shown in table (5) refer to non-significant differences in total count of bacteria between the treatments at one day age that ranged between 13× $10^3$and × $10^3$24 CFU/GM , but clear development in counts of these bacteria was obtained with advancing the cooled storage time and their counts at end of storage time (14 day) were 25× 10^5, 25 × 10^5 and 37×10^6 cfu/gm in cheese treatments T1 , T2 and T3 respectively , the bacteria count was less when potassium was added alone followed by the mixing of potassium and sodium at rate of 1:1 treatment , while when

sodium salt was used alone (T3 treatment), the bacterial count was the more and this indicates that potassium had more role than sodium in limiting microorganism growth when it was used (He and Macgregor, 2001).

In the two cheese treatments (T4 and T5) in where chesses samples were kept in the saline solution , the total counts of bacteria at 14 day age were $13\times 10^5$and 9×10^5 cfu/gm respectively and they were less in their values in T1 , T2 and T3 treatments , that may be due to that use of 5% salt of saline solution was convenient for inhibition of growth of some species of bacteria that do not tolerate this concentration of salt, while in the psychrophilic bacteria , the count of bacteria developed with increase of cooled storage time and reached 10×10^4, 4×10^4, $310^5\times$, $10\times 10^3$and 23×10^3 cfu/gm at 14 days age after they were 3×10^1 , 4×10^1 , 6×10^1, 23×10^1 and 19×10^1 cfu/gm at one day age for the treatments T1 , T2 , T3 , T4 and T5 respectively . The reason of such development in bacteria counts may be due to availability of the convenient temperature degrees for bacteria growth at which the treatments were kept at low temperature (6±2 °C).

The results did not refer to presence of yeasts and molds cells during the 14 days of storage time in the treatments except presence of 3×10^1 cfu/gm in the T5 treatment after 14 days storage , the results showed also free of all the soft white treatments of bacteria on all storage times.

Table 5: Microbiological tests results of the soft white cheese during cooled storage time (6±2 C) for 14 days.

Tester	Cheese age (day)	treatments						LSD
		T1	T2	T3	T4	T5	T6	
Total count bacteria	1	13×10^3	13×10^3	16×10^3	24×10^3	23×10^3	16×10^3	*102.64
	7	32×10^3	32×10^3	13×10^5	5×10^4	24×10^4	15×10^5	
	14	25×10^5	25×10^5	37×10^6	13×10^5	9×10^5	39×10^6	
Coleform	1	0	0	0	0	0	0	0.00 NS
	7	0	0	0	0	0	0	
	14	0	0	0	0	0	0	
yeasts & molds	1	0	0	0	0	0	0	30.0 NS
	7	0	0	0	0	0	0	
	14	0	0	0	0	3×10^1	0	
Ps. Bacteria	1	3×10^1	3×10^1	6×10^1	23×10^1	19×10^1	2×10^1	*64.88
	7	8×10^2	8×10^2	17×10^3	34×10^2	33×10^2	8×10^2	
	14	10×10^4	10×10^4	3×10^5	10×10^3	23×10^3	11×10^4	

*The readings represent mean of two replicates .

The sensory properties such as , flavor, taste , consistency , color, general appearance , and bitter were studied according to sensory questionnaire prepared for this purpose and the studied soft , white cheese results were as follow and as they were shown in table (6). The consistency , color and general appearance results had no significant differences of the average of the given degrees of these properties , the readings were approximate in all the treatments at one and seven days of storage time , in the 14th day of storage , decline in the average of the given degrees of these properties in all the treatments and the T4 and T5 treatments got less degrees of means than the rest of the treatments in the consistency , general appearance and color properties , which were 6 and 6.5 degrees in consistency property and 7 and 6 degrees in general appearance property and seven degrees for color property in both of the treatments . This decline in the mean of the given degree in these properties in T4 and T5 treatments may be due presence of the saline solution in 5% concentration and that may affect negatively on these properties with advance of storage time .

The more properties that were affected by kind of the used salt were taste , flavor ,and bitter and the treatments which had potassium salt in their structure got less means of degrees than the only potassium salt contained treatment and that was clear in all the storage ages (1, 7, and 14 days). The added potassium salt had little effect in appearance of bitter taste in its treatments ,and the T1 and T2 treatments got means of degrees ranged between 8 and 9 compared with 10 degrees that was given by T3 treatment , the bitter taste did not appear in T4 and T5 treatments in the beginning of the cooled storage time and at the seventh day it was a little bitter in the T4 treatment and it developed to become more clearness at end of storage time , the appearance bitter taste may be due in this treatment to the used potassium chloride salt in the saline solution

in which cheese was saved inside cheese mold with advance storage time and this helped the evaluators to sense this bitter taste that was more clearness at 14 day storage .

The got development in the total count of bacteria in general level and the count of the psychrophilic bacteria in special level had special role in bitter taste appearance in these treatment , these bacteria work on protease enzymes production that help of protein decomposition in these treatments (Moatsou and Govaris , 2011). A slight bitter taste was appeared in the T5 treatment and it was seasoned by some of the evaluators and that may be due to the development in the total counts of bacteria in general level and count of the psychrophilic bacteria in special level.

Table 6: sensory tests results of the produced Soft cheese treatments that were saved at 6+ 2c for 14 days .

sensory properties	Age (day)	tretments						LSD
		H1	H2	H3	H4	H5	H6	
taste & flavor	1	8	9	10	9	10	10	*2.63
	7	8	8	9	7	8	8	
	14	7	7	6	6	7	7	
body	1	9	9	9	9	9	9	*2.07
	7	9	9	9	8	8	9	
	14	7.5	8	8	6	6.5	8	
color	1	10	10	10	10	10	10	2.2 *9
	7	10	10	10	8	9	10	
	14	9	9	8	7	7	9	
salting	1	10	9	10	8	8	10	*1.82
	7	9	9	10	9	9	10	
	14	8	8	9	10	10	8	

Haloum cheese: After production of four treatments of the isolated buffalo milk cheese, the chemical composition of these treatments , lactic acid ability and pH , fat , protein and salt ratio were determined. The results as they are shown in table 7 indicated that acidity ratio, fat ratio ,protein ratio and salt ratio ranged between (0.25-0.27) , (5-7%) , (23-24) and (3-7) respectively in all of these cheese treatments , while pH value was 6.2 . these cheese treatments , while pH value was 6.2 . These indicate there were no significant differences in the studied chemical components between all of these treatments and that may be due to that all the produced treatments were manufactured from the same source and under the same condition. These results agree with finding of Bulent et al (2011) when they studied Haloum cheese properties in Turkish markets and they mentioned that fat ratio, protein , salt and pH of the studied samples ranged between (23-28), (13.19- 30.95), (1.60 - 4.80%) and (5.37 – 6.45) respectively.

Table 7: the chemical composition percentages of the produced Haloum cheese treatments.

treatments	chemical composition				
	Acidity%	pH	Fat%	Protein%	Salt%
H1	0.26	6.2	65	23	3
H2	0.27	6.2	5	24	5
H3	0.27	6.2	5	23	3
H4	0.25	6.2	6	23	7
LSD	0.109 NS	0.437 NS	1.50 NS	2.75 NS	2.39 NS

The readings were taken often one day from production

In order to look on the goodness of these treatments from microbiological point of view through their 30 days storage time , the total counts of bacteria and psychrophilic bacteria counts and bacteria counts were monitored besides determinations of yeasts and molds counts . The results in Table 8 show that the average of the total count of the four treatments ranged between 18×10^1 and 15×10^2 cfu/gm and when these treatments were stored at cooling temperature degree, an advance in counts of these bacteria was obtained and ranged

between 21×10^1 to 64×10^6 cfu/gm, these results agree with results of Abo- Giza (2007) for the produced low fat Haloum cheese that collected from different regions in Syria , the total bacterial counts ranged between 1.8×10^3 to 4.6×10^6 cfu/gm and agree with findings of Kamleh et al (2012) when samples of Haloum cheese were stored at low temperature (5 C°) for their storage age determination .

There was no growth or coliform bacteria , yeasts and molds presence during cheese storage time. These counts were in range of the Syrian standard properties of 2000 of Haloum cheese. The counts of the psychrophilic bacteria ranged between 4×10^1 and 21×10^1 cfu/gm in one day age and increased to reach to 30×10^4 and 81×10^4 cfu/gm at 30 days age of storage , this increase of the bacteria counts is considered natural due to the cooled storage condition at which the treatment were saved.

A sensory evaluation was done on the produced treatments in taste & flavor , consistency , color and bitter properties besides the general appearance through cooled storage time which lasted for 30 days . The readings in table (9) show that all the treatments had very good taste and flavor and they got 10 degrees in the starting of storage time in all Haloum cheese treatments and they declined to 8 degree in 21 day age till the end of the storage time in H1 and H2 treatments in which were saved in 5*10% potassium salt solution compared with H3 and H4 treatments which were saved in 5 and 10% sodium salt solution as they got 9 and 10 degrees respectively. A slight bitter was recorded in H1 and H2 treatments in 21 days age and lasted till 30 day age and these were reflected on the given degrees to taste and flavor properties at these ages . It was not observed significant differences between the treatments with consistency , color and general appearance during storage time.

Table 8: microbiological tests results of the produced Haloum cheese treatment that were saved at 6±2 C° for 30 days.

tester	Cheese age (day)	H1	H2	H3	H4	LSD
Total count bacteria	1	3×10^2	13×10^3	16×10^3	24×10^3	*102.64
	7	2×10^3	32×10^3	13×10^5	5×10^4	
	14	5×10^4	25×10^5	37×10^6	13×10^5	
	21	13×10^5	^{3}10×10	^{5}10×43	^{5}10×32	
	30	33×10^5	^{4}10×3	^{6}10×64	^{6}10×36	
Coleform	1	0	0	0	0	0.00 NS
	7	0	0	0	0	
	14	0	0	0	0	
	21	0	0	0	0	
	30	0	0	0	0	
yeasts & molds	1	0	0	0	0	30.0 NS
	7	0	0	0	0	
	14	0	0	0	0	
	21	0	0	0	0	
	30	0	0	0	0	
Ps. bacteria	1	3×10^1	3×10^1	6×10^1	23×10^1	*64.88
	7	8×10^2	8×10^2	17×10^3	34×10^2	
	14	10×10^4	10×10^4	3×10^5	10×10^3	
	21	22×10^4	67×10^4	42×10^3	39×10^2	
	30	41×10^4	81×10^4	30×10^4	38×10^4	

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Table 9: sensory tests results of the produced Haloum cheese treatments that were saved at 6+ 2c for 30 days .

treatments	Age (day)	sensory properties					totale (50)
		color	general appearance	bitter	body	taste & flavor	
H1	1	9	9	10	9	10	46
	7	9	9	9	9	10	46
	14	9	9	9	9	9	45
	21	9	9	8	9	8	43
	30	9	9	8	9	8	43
H2	1	9	9	10	9	10	46
	7	9	9	9	9	9	45
	14	9	9	8	9	9	43
	21	9	9	8	9	8	43
	30	9	9	8	8	8	42
H2	1	9	9	10	10	10	48
	7	9	9	10	9	10	47
	14	9	9	10	9	9	46
	21	9	9	10	9	9	44
	30	9	9	10	9	9	44
H3	1	9	9	10	9	10	47
	7	9	9	10	9	10	47
	14	9	9	10	9	10	45
	21	9	9	10	9	10	45
	30	9	9	10	8	9	44
LSD		0.0 NS	0.0 NS	1.60 NS	1.52 NS	*1.75	*3.52

From these results, it may be concluded that it is possible to produce the soft , white cheese and Haloum cheese from the remained buffalo milk that enriched with 3% full fat dry milk after production of Iraqi local cream and sodium chloride salt can be used instead of sodium chloride salt in production of these cheese and this refers to possibility of production of some cheese types having less effect on consumptions health.

Test of the accurate synthetic structure by the scanning microscope.

The chesses chemo biological changes can be identified by study their structural properties (Madadlou et al , 2005) .Figures 1 and 2 show the accurate microscopic structure of both of the produced soft cheese (at 3 day age) and Haloum cheese (at 7day age) from buffalo milk and cow milk and with 20 micrometer zoom in power and zoom in count equal to 1000 time , the tables show that the accurate synthetic structure of cheese treatment is an open proteins mold has fatty granules with different shape and size cavities and presence of holes indicates on the space that included by fatty granules with their size and they are coming to gather as clusters and this indicates on the high fat content in the mold of the produced cheese from the full fat cow milk compared with the low fat buffalo milk as the proteins mold of this cheese differs in its low diffused fatty granules inside the mold and this may be due to the low fatty content and high protein content of this cheese beside of increase of protein mold compact and the small holes that may be the responsible on the more stability of cheese of this treatment

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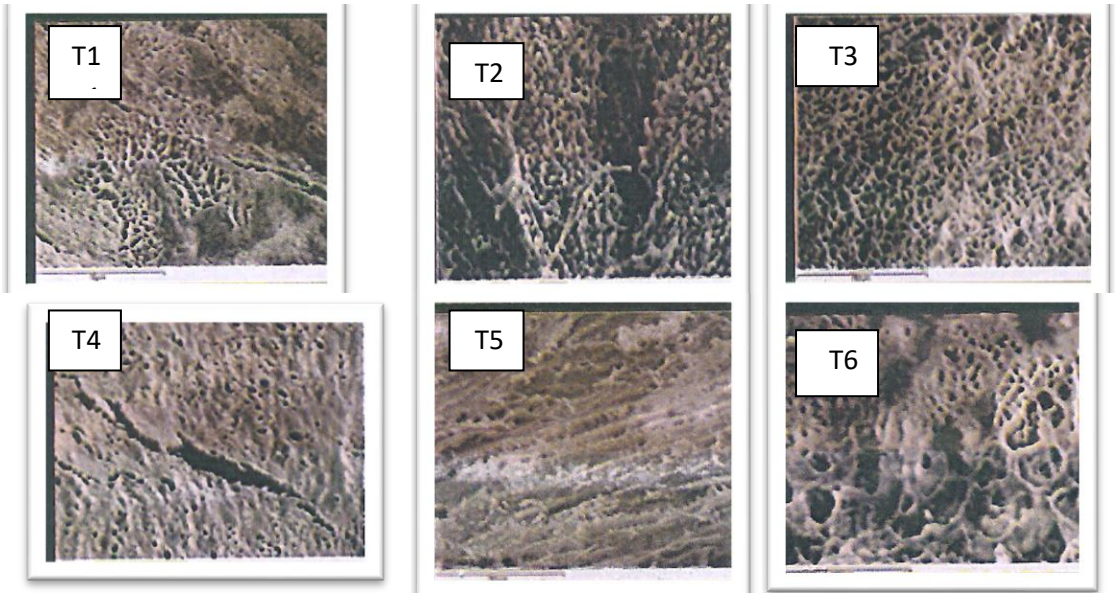
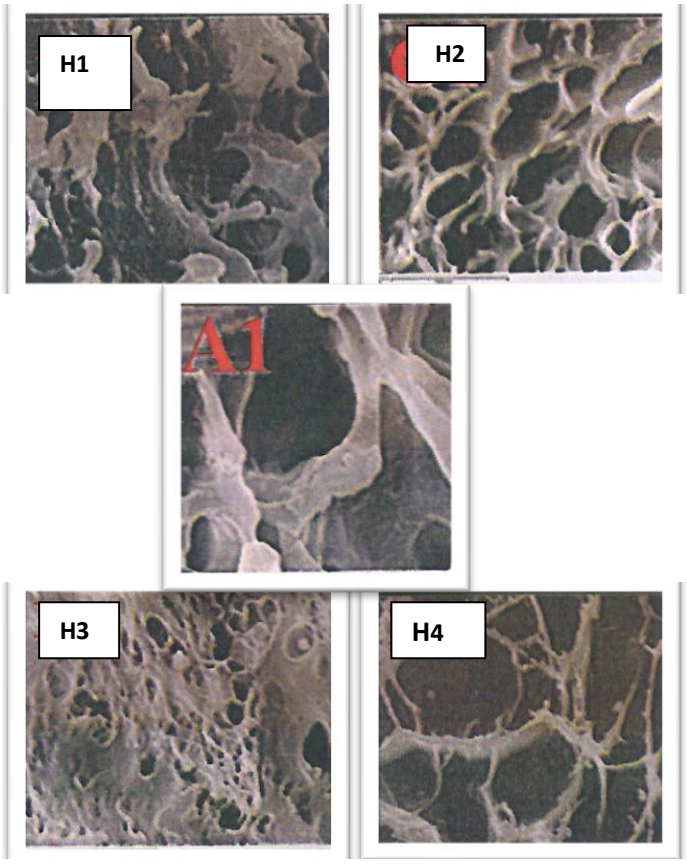


Figures 1: accurate microscopic structure of the produced soft cheese from buffalo milk and cow milk at 3 day age and with 20 micrometer zoom in power and zoom in count equal to 1000 time



Figures 2: accurate microscopic structure of Haloum cheese from buffalo milk and cow milk at 7 day age and with 20 micrometer zoom in power and zoom in count equal to 1000 time

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