Assiut J. of Agric. Sci., 39 (2) (71-85)

QUALITY ENHANCEMENT OF LOW FAT RAS CHEESE.*

Abd-Ellah. A. Abd-Alla, Shaker M. El-Gendy, Fathy E. El-Gazzar and Esmat M. Ibrahim.

Dairy Department, Faculty of Agriculture, Assiut University, Assiut, Egypt.

Abstract: Ras cheese was made by the traditional method from a mixture of buffalo's and cow 's milk. The resultant cheese was chemically, microbiologically and sensory evaluated during ripening (90 d.). The results indicated that moisture, fat, fat in dry matter, soluble nitrogen, soluble nitrogen coefficient, total volatile fatty acids, soluble tyrosine and soluble tryptophane of fresh Ras cheese decreased significantly with the decrease of fat levels in cheese milk. However, acidity, salt, salt in serum, total nitrogen and total protein increased significantly in fresh Ras cheese with the decrease of fat levels in cheese milk. By prolonging the ripening period, moisture content decreased significantly. In contrast, acidity, salt, salt in serum, fat, fat in dry matter, total nitrogen, total protein, soluble nitrogen, soluble nitrogen coefficient, soluble tyrosine, soluble tryptophane and total volatile fatty acids increased significantly for all treatments. It is obvious that the use of different fat levels in cheese milk had no observable effect on the numbers of total bacterial count, lactic acid bacteria, as well as the psychrotrophic, proteolytic bacteria and yeasts & molds which found in the resultant fresh Ras cheese. On the other hand, population of these microorganisms increased during the ripening period up to fourth week then decreased up to the end of ripening period. In general, no tested samples of the resultant cheese were rejected by the consumers.

Key words: ras cheese, low fat cheese, quality.

Introduction

Ras cheese (Cephalotery type) is considered the most popular hard cheese in Egypt, which has a great acceptance by the Egyptian and Arabian consumers. This cheese made from cow's milk or a mixture of cow's and buffalo's milk. Ras cheese is normally consumed after a ripening period of 4 months. This period gives a fully ripened product (El-Sayed *et al.*, 1993).

The American Association has recommended the reduction of the fat intake to lower blood cholesterol, which presumably reduces risk of strokes and heart attacks (Badawi and Kebary, 1998).

*Submitted to the 2nd Conference Of Junior Scientists, Fac. of Agric. Assiut Univ. May.,6,2008.

The health problems with fat focus on two main issues too much dietary fat and too much of that fat from animal food sources. Too much fat in the diet will be stored as increasing addipase tissue and body wieght. This increased body weight has been associated with health problems such as diabetes, hypertension and heart diseases. Also animal fat includes too much saturated fatty acids which are associated with atherosclerosis, that contributes to heart attacks and strokes (Williams, 1985).

Several problems are encountered in the production of low fat hard cheeses. The use of traditional processes to manufacture hard cheese from milk of low-fat content results in the production of cheese which lack the full flavour and the desired texture, where it is more firmer and less smooth. Modification of cheesemaking process have been used to make a good quality low fat Cheddar cheese (Banks et al., 1989).

Incorporating of whey proteins into cheese is desirable because they increase the moisture content of cheese and improve the final cheese quality (Banks, 1990). Whey proteins could be incorporated into cheese either by heat treatment of milk prior to cheesemaking or by adding the denatured whey protein into cheese milk prior renneting (Banks, 1990).

The renneting properties of heat treated milk could be restored by adding calcium chloride, raising coagulation temperature and lowering the pH of milk prior to cheesemaking (Marshall, 1986).

Many commercial fat replacers are available for use in foods and they are classified as fat-based fat replacers, protein-based fat replacer and carbohydrate fat replacers (Giese, 1996). Although some low fat Ras cheese made with fat replacers were acceptable after 6 months, most of them need to accelerate the ripening to get the full flavour and desired body and texture (Badawi, 1998).

Within the past few years, there has been substantial interest in the development of new dairy products which are similar to the existing products but in which the fat content is substantially reduced. Many efforts have been directed to make a low fat cheese. Some cheese varieties have been made successfully especially soft cheese such as Cottage cheese and cream cheese. Several problems are encountered in the production of hard cheese such as Ras cheese from low fat milk.

To overcome the previous problems many methods have been used. Several low – calorie

and calorie – free fat replacements and fat substitutes have been used in the manufacture of dairy products such as frozen desserts, yoghurt, cheese spreed and cream cheese (Degouy, 1993).

Hence, the present study was undertaken to determine and characterize how far cheese made with low fat was acceptable by consumers.

Materials and Methods

Cheese Milk.

A mixture of cow's (Jersey) and buffalo's milk was used to manufacture Ras cheese. Milk was obtained from the herd of the Faculty of Agriculture, Assiut University.

Rennet.

Local commercial liquid calf rennet obtained from local market, was added to cheese milk in an amount required to coagulate unsalted milk within 40- 45 minutes at 35 °C .

Salt.

Clean good grade of cooking salt was used to manufacture Domiati cheese.

Starter.

Pure cultures of *Streptococcus thermophilus* 14486, *Lactobacillus delbrueckii sub.sp.bulgaricus* 11842 and *Lactobacillus casei sub. sp. casei* 393 were used.These cultures were supplied by the American Type Culture Collection (ATCC).

Wax .

Commercial fine grade paraffin and bee wax were obtained from the local market in Assiut, Egypt.

Calcium Chloride.

Fresh solution of 40% calcium chloride was prepared and 1 ml was added to each 2 kilograms of heated milk to give a final concentration of 0.02 percent .

Fat Replacers.

Carbohydrate-based fat replacer called Textra® was obtained from National Strach & Chemical Co., Prestbury Court, Manchester M_{55} 5L W.

Ras Cheese Manufacture.

Ras cheese was made from cow's and buffalo's milk. The milk was heated momentarily to 72°C and the procedure suggested by Abdel Tawab (1963) for Ras cheese making was followed.

The following treatements were studied

Control : Cheese made from milk contained (4% fat and 2% salt) .

Treatment 1: Cheese made from milk contained (2% fat and 2 % salt) and adding fat replacers 0.18 %.

Treatment 2: Cheese made from milk contained (2% fat and 2 %

salt) and heated milk momentarily at 80 °C.

Treatment 3: Cheese made from milk contained (2% fat and 2 % salt) and adding sodium citrate 0.2 %.

The experimental cheese was soaked in potassium sorbate solution (0.66% w/ v) for one minute in an attempt to prevent surface growth of molds according to Bohme *et al.* (1996).

Cheese Analysis:

Titratable acidity, moisture, soluble nitrogen were determined according to A.O.A.C. (2000). Salt content of cheese was estimated as described by Pearson (1975). The fat content of cheese samples was estimated as described by Agarawella and Sharma (1961). The total nitrogen content of cheese samples was measured by Kjeldahl method adopted by Rowland (1938). Total volatile fatty acids were determined by the distillation method described by Kosikowski (1966). All values are expressed as ml. 0.1 N NaOH /100 g. cheese. Soluble tyrosine and tryptophane content of cheese were determind spectrophotometrically according to the method of Vakaleris and Price (1959).

Total bacterial count was determined using plate count agar as described by the Manual of Microbiological Methods (1957). The colonies of proteolytic bacteria were enumerated on skim milk agar media. The respective colonies exhibiting clear zones on skim-milk agar were identified as described by Ewings *et al.* (1984). Yeasts and molds in cheese samples were counted on potato dextrose agar medium at pH 3.5 with adding an antibiotic (Deibel and Lindquist, 1981). Lactic acid bacteria in cheese samples were counted using MRS (DeMan, Rogosa, Sharpe) medium according to Marshall (1992). Psychrotrophic bacteria in cheese samples were carried out as described for the standard plate count except incubation of plates were at 7 ± 1 for 10 days (Vedamuthu *et al.*, 1978).After plate counts were obtained, averages were calculated, and results are given as the $\log_{10}$ of such values.

Statistical analysis for the obtained data was carried out using the Statistical Analysis System (SAS, 1988).

Organoleptic properties of variantly examined cheese samples were checked by five different dairy technologists as well as by more than 10 normal consumers, using the 100 mark-system (El-Gazzar, 1979 & 1983).

Results and Discussion

Cheese Moisture.

Results in table (1) indicate that moisture content of fresh Ras

cheese made from milk heated momentarily at 80 °C (treatment 2) contained higher moisture content than other treatments, followed by those of treatment (control), treatment 1 then treatment 3. The increase in moisture content of cheese made from heated milk might be due to impairing of whey syneresis from curd (Walstra *et al.*, 1985). The moisture content of all cheeses decreased significantly ($P < 0.01$) as the ripening period progressed. These results are in agreement with those obtained by Kebary *et al.* (2002) and Abou El-Nour *et al.* (2004).

Cheese Acidity.

The titratable acidity of fresh Ras cheese with different fat levels are given in table (1). It was noticed that samples of the treatment 3 had the highest acidity at the beginning and during ripening, followed by treatment 2, 1 and control. Cheeses made from heat-treated milks had higher titratable acidity than those made from untreated milk. It appears that heat treatment of milk improves its quality as a substrate for growth of lactic acid bacteria and acid development (Kebary *et al.*, 1996). It could be also observed that the acidity increased significantly ($P < 0.01$) throughout the ripening period for all the studied treatments. This could be due to the growth of starter bacteria throughout the ripening period. These results are in agreement with those of Hashem (2002) and Kebary *et al.* (2002).

Fat Content.

Fat determinations of cheese made from different milk fat levels are presented in table (1). It is evident that fat content of cheese decreased significantly ($P < 0.01$) with the decrease of the cheese milk fat levels.

During ripening period the fat content increased significantly ($P < 0.01$) for all the investigated treatments. These results are in agreement with those of Hashem (2002) and Kebary *et al.* (2002).

Table (1) shows that the fat content in dry matter decreased significantly ($P < 0.01$) with decreasing cheese milk fat levels. These results are similar to those of Abou El-Nour *et al.* (2004). It is obvious that the fat content in dry matter increased throughout the ripening period.

This increase might be due to rapid proteolysis and slow lipolysis during ripening. (Abd El-Gawad *et al.* (1990) and Okasha (2001).

Salt Content in Cheese and Serum.

Table (1) indicate that the samples of treatment 1 had the highest salt content in the fresh cheese and along its ripening period compared with the other treatments, followed by those of

treatment 3 , 2 and (control). From the obtained results, it could be also observed that the salt content of all treatments increased significantly ($P < 0.01$) as ripening period extended. These results are in harmony with those of Abou El-Nour *et al.* (2004).

Results in table (1) indicate that the samples of treatment 3 had the highest salt content in serum of fresh cheese and along its ripening period, compared with the other treatments, followed by those of treatment 1, 2 then (control). This could be due to the decrease of their moisture content. From the obtained results, it could be also observed that the salt content in serum increased significantly ($P < 0.01$) throughout the ripening period for all the treatments. These results are in agreement with those of Hashem (2002).

Total Volatile Fatty Acids.

Total volatile fatty acids (TVFA) content of cheese made from milk with different fat levels are presented in table (1). It is evident that TVFA content of cheese decreased significantly ($P < 0.01$) with the decrease of fat levels in the cheese milk. The samples of control had the highest TVFA content in the fresh cheese and along its ripening period, compared with the other treatments, followed by those of treatment 3, 2 then treatment 1. During ripening period TVFA content increased significantly ($P < 0.01$) for all the treatments. These results are in harmony with those of Hashem (2002) and Kebary *et al.* (2002).

Nitrogen Content.

Table (2) indicates that the total nitrogen of fresh Ras cheese made from cheese milk with different fat levels increased significantly ($P < 0.01$) with the decrease of the fat levels in cheese milk. It was noticed that samples of the treatment 2 had the highest total nitrogen at the beginning and during ripening followed by treatment 3, 1 and (control). During ripening period the total nitrogen content increased significantly ($P < 0.01$) for all the treatments. These results are in agreement with those of Kebary *et al.* (2002) and Abou El-Nour *et al.* (2004).

It is evident from table (2) that total protein content of cheese increased significantly ($P < 0.01$) with the decrease of the cheese milk fat levels. It was also noticed that samples of the treatment 2 had the highest total protein at the beginning and during ripening followed by treatment 3, 1 as compared with (control). It could be also observed that the protein content increased significantly ($P < 0.01$) for all the treatments with the prolongation of ripening period. These results are in harmony with those of Hashem (2002).

Soluble Nitrogen and Soluble Nitrogen Coefficient.

The soluble nitrogen content (SN) is taken as index for cheese protein proteolysis during ripening. It is commonly calculated as per cent of total nitrogen (SN/TN %). It is obvious from table (2) that samples control cheese had the highest soluble nitrogen content (SN) in the fresh cheese and along the ripening period, compared with the other treatments, followed by those of treatment 2, 3 then treatment 1. It could be also noted that the soluble nitrogen increased significantly ($P<0.01$) throughout the ripening period for all the treatments. These results are in harmony with those of Kebary *et al.* (2002) and Abou El-Nour *et al.* (2004).

Table (2) shows that the soluble nitrogen coefficient decreased significantly ($P < 0.01$) with the decrease of cheese milk fat levels. It was noticed that samples of control had the highest soluble nitrogen coefficient (SN / TN %) in the fresh cheese and along its ripening period compared with the other treatments, followed by those of treatment 3, 2 then treatment 1. From the obtained results, it could be also observed that the soluble nitrogen coefficient increased significantly ($P < 0.01$) for all the treatments. Confirmatory to these results were also obtained by Okasha (2001) and Hashem (2002).

Soluble Tyrosine and Soluble Tryptophane.

Reduction of fat content of cheese milk caused a significant ($P < 0.01$) decrease in soluble tyrosine and soluble tryptophane production , which might be due to the lower moisture content and higher salt content (lower water activity) which in turn suppress the growth of proteolytic bacteria, which might inhibit the proteases activity themselves (Khader *et al.* 1995).

Table (2) shows that the samples of control cheese had the highest soluble tyrosine in the fresh cheese and along the ripening period as compared with the other of treatments. Among the treatments,: samples of treatment 2 had the higher soluble tyrosine followed by treatment 3 and 1. On the other hand, the soluble tyrosine increased significantly ($P < 0.01$) in all treatments. Confirmatory to the results were also obtained by Khader *et al.* (1995) and Kebary *et al.* (2002).

Data in table (2) show that the samples of control had the highest soluble tryptophane in the fresh cheese and along its ripening period compared with the other treatments, followed by those of treatment 2, 1 then treatment 3. From the obtained

results, it could be also observed that soluble tryptophane increased significantly ($P < 0.01$) for all the treatments. These results are in agreement with those of Khader *et al.* (1995) and Kebary *et al.* (2002).

Table(1): Composition of low fat Ras cheese during ripening period.

Treatments	Ripening Period (wk)	Moisture %	Acidity %	Salt %	Salt in Serium %	Fat %	Fat / D.M %	TVFA
Cheese milk 4%fat and 2% salt (control)	Fresh	41.05	1.32	3.32	8.07	31.67	53.72	18.50
	2	38.93	1.47	3.60	9.26	32.00	52.39	26.50
	4	37.48	1.62	3.79	10.12	33.83	54.13	52.17
	8	35.85	1.87	3.86	10.77	34.67	54.04	72.83
	12	34.94	1.96	4.00	11.45	35.83	55.08	77.17
Cheese milk 2% fat and 2% salt + (fat replacers 0.18%) (Treatment1)	Fresh	39.09	1.36	3.96	10.12	18.67	30.66	14.83
	2	37.89	1.59	4.62	12.19	20.17	32.45	26.50
	4	37.18	1.71	4.67	12.55	21.00	33.43	38.83
	8	35.94	1.83	4.80	13.35	22.17	34.59	53.17
	12	34.30	2.18	4.89	14.25	23.17	35.24	67.83
Cheese milk 2%fat and 2% salt + (heating milk momentarily at 80 °C) (Treatment 2)	Fresh	41.94	1.40	3.58	8.53	20.83	35.89	14.83
	2	39.30	1.57	3.68	9.37	21.33	35.15	22.17
	4	37.97	1.81	3.88	10.23	21.67	34.93	39.17
	8	36.93	1.96	4.08	11.05	22.17	35.14	59.83
	12	35.04	2.05	4.31	12.31	23.00	35.40	74.50
Cheese milk 2%fat and 2% salt + (sodium citrate 0.2%) (Treatment 3)	Fresh	36.93	1.43	3.89	10.53	19.50	30.93	15.83
	2	35.66	1.57	4.02	11.31	19.00	29.53	25.17
	4	34.57	1.75	4.10	11.88	19.50	29.80	40.83
	8	33.59	1.87	4.35	12.98	20.17	30.36	61.17
	12	32.17	2.02	4.64	14.45	20.83	30.71	79.50

Table(2): Protein content of low fat Ras cheese and its breakdown during ripening period.

Treatments	Ripening Period (wk)	T.N%	T.P %	S.N %	S.N/ T.N %	Soluble Tyrosine	Soluble Tryptophane
Cheese milk 4%fat and 2% salt (control)	Fresh	2.29	14.59	0.33	14.37	31.38	21.18
	2	2.47	15.76	0.45	18.14	65.74	35.17
	4	2.75	17.55	0.54	19.64	91.34	57.20
	8	2.87	18.29	0.66	23.03	115.48	74.23
	12	3.02	19.25	0.76	25.10	153.33	90.89
Cheese milk 2% fat and 2% salt + (fat replacers 0.18%) (Treatment1)	Fresh	2.52	16.08	0.28	11.34	29.50	20.17
	2	2.69	17.16	0.45	16.69	63.88	33.5
	4	2.87	18.31	0.61	21.20	89.54	56.35
	8	3.02	19.25	0.75	24.89	114.25	73.26
	12	3.17	20.22	0.89	27.97	150.66	89.11
Cheese milk 2%fat and 2% salt + (heating milk momentarily at 80 °C) (Treatment 2)	Fresh	2.71	17.29	0.32	11.70	31.23	21.05
	2	2.87	18.31	0.43	15.00	65.15	34.91
	4	3.02	19.25	0.57	18.92	90.17	56.87
	8	3.15	20.08	0.72	23.02	115.60	73.90
	12	3.28	20.91	0.85	26.08	151.27	90.58
Cheese milk 2%fat and 2% salt +(s odium citrate 0.2%) (Treatment 3)	Fresh	2.52	16.08	0.30	11.88	29.96	19.20
	2	2.75	17.55	0.39	14.18	63.89	32.25
	4	2.88	18.37	0.51	17.66	84.82	55.24
	8	3.02	19.25	0.63	20.74	113.59	72.23
	12	3.15	20.08	0.71	22.53	149.25	87.33

Microbial Content.

Results in table (3) show the microbial changes in Ras cheese for all treatments during ripening period. It is clear that the maximal numbers of all of the studied bacterial groups were found in the fresh cheese for all treatments. Control cheese had the highest bacterial counts followed by treatment 2, treatment 1, then treatment 3. However, total bacterial count of all cheese treatments increased gradually up to the second week of ripening period then decreased slightly up to the end of ripening period. This decrease was 1.48 order of magnitude at the end of the ripening period (12 weeks) for control cheese. Values for

treatments 1, 2 and 3 were 1.64, 1.23 and 0.78, respectively. These results are in harmony with those of Hashem (2002), Fahmy (2003).

Results in table (3) show that the growth of lactic acid bacteria occurred in the fresh cheese of all investigated treatments was nearly similar. Moreover, number of lactic acid bacteria in all cheese treatments increased gradually up to the second week of ripening period then decreased slightly up to the end of ripening period. This decrease was 2.04 order of magnitude at the end of the ripening period (12 weeks) for control cheese. Values for treatments 1, 2 and 3 were 1.04, 1.64 and 0.97, respectively. These results are in agreement with those of Fahmy (2003).

From the obtained results, it could also be observed that the psychrotrophic bacterial count in the fresh cheese for all investigated treatments was somewhat similar. However, psycrotrophic bacterial count of all cheese treatments increased gradually up to the fourth week of ripening period then decreased slightly up to the end of ripening period.

Results in table (3) show that the proteolytic bacterial count in the fresh cheese for all the investigated treatments was nearly similar. Moreover, proteolytic bacterial count of all cheese treatments increased gradually up to the second week of ripening period then decreased slightly up to the end of ripening period. This decrease was 1.04 order of magnitude at the end of the ripening period (12 weeks) for control cheese. Values for treatments 1, 2 and 3 were 1.22, 0.94 and 1.84, respectively. These results are in harmony with those of Okasha (2001), Fahmy (2003).

From the obtained results, it could also be observed that the number of molds and yeasts occurred in the fresh cheese for all the investigated treatments. The treatment 2 had the highest number of molds and yeasts followed by treatment 1, treatment 3 then control. Molds and yeasts increased during the ripening period. This increase was 2.6 orders of magnitude at the end of the ripening period (12 weeks) for control. Values for treatments 1, 2 and 3 were 2.02, 1.97 and 2.04, respectively. These results are in agreement with those of Hashem (2002).

Organoleptic Properties

The quality of Ras cheese was organoleptically evaluated during the ripening period (Table 4). It is obvious from that table that as ripening period progressed, the quality of cheeses treatments improved reaching the highest score by the end of the ripening period (3 months).

From the obtained results, it could be also observed that the samples of control had the highest score in the fresh cheese and along its ripening period compared with the other treatments, followed by those of treatment 1, 2 then treatment 3. By prolonging ripening period the total grades of control, treatment 1,2 and 3 were 90, 86, 86 and 74 respectively. In general, no tested samples of the resultant cheese were rejected by the consumers.

Table(3): Microbial content of low fat Ras cheese during ripening period.

Treatments	Ripening period in weeks	Microbial count C.F.U / g of cheese (log_{10})				
		Total bacterial count	Lactic acid bacteria	Psychrotrophic bacteria	Proteolytic bacteria	Yeasts and Molds
Cheese milk 4% fat and 2% salt (control)	Fresh	7.17	6.35	3.84	6.35	1.31
	2	7.31	6.47	4.32	6.69	3.39
	4	6.74	5.69	4.57	6.23	4.17
	8	5.95	5.47	3.47	5.47	3.95
	12	5.69	4.31	3.34	5.31	3.91
Cheese milk 2% fat and 2% salt + (fat replacers 0.18%) (Treatment1)	Fresh	6.95	6.61	3.95	6.47	2.21
	2	7.17	6.95	4.25	6.77	3.39
	4	6.65	6.69	5.44	6.34	3.71
	8	6.25	6.49	4.31	5.31	3.95
	12	5.31	5.91	4.17	5.25	4.23
Cheese milk 2%fat and 2% salt +(heating milk momentarily at 80 °C) (Treatment 2)	Fresh	7.07	6.25	3.39	6.01	2.39
	2	7.34	6.07	4.17	6.47	3.39
	4	6.61	5.77	5.71	6.14	3.31
	8	6.08	5.31	4.47	5.31	4.27
	12	5.84	4.61	4.07	5.07	4.36
Cheese milk 2% fat and 2% salt + (sodium citrate 0.2%) (Treatment 3)	Fresh	6.69	6.31	4.61	6.31	2.17
	2	7.17	5.91	4.71	6.84	3.34
	4	6.39	5.84	5.31	6.17	4.07
	8	5.61	5.61	4.84	5.07	3.84
	12	5.91	5.34	4.17	4.47	4.21

Table(4): Organoleptic properties of low fat Ras cheese during ripening period.

Treatments	Ripening period in weeks	Flavor (50)	Body & texture (40)	Appearance (10)	Total (100)
Cheese milk 4% fat and 2% salt (control)	4	41	33	7	81
	8	43	35	8	86
	12	44	37	9	90
Cheese milk 2% fat and 2% salt + (fat replacers 0.18%) (Treatment1)	4	38	33	8	79
	8	40	35	8	83
	12	41	37	8	86
Cheese milk 2% fat and 2% salt + (heating milk momentarily at 80 °C) (Treatment 2)	4	37	33	8	78
	8	39	36	8	83
	12	40	38	8	86
Cheese milk 2% fat and 2% salt + (sodium citrate 0.2%) (Treatment 3)	4	33	28	7	68
	8	35	30	7	72
	12	36	31	7	74

References

Abd El Gawad, I. A., M. M. Metwally, A. E. Moussa, and E. M. El-Sayed. 1990. The selection of a proper starter for Ras cheese-Making made from cow milk. Zagazig J. Agric. Res. 17: 781- 792.

Abdel –Tawab, G. 1963. Manufacturing Ras cheese from pasteurized milk, c.a. Youseff (1966), M. Sc. Thesis, Fac. Agric. Ein Shames Univ.

Abou El-Nour, A M., F. M. Abbas, R. A. N. Khalil, and M. S. El-Safty. 2004. Modified manufacturing procedddure for improving the quality of low fat Ras cheese. Egyptian J. Dairy Sci. 32 : 141– 152.

Agarawella, A. C., and R. M. Sharma. 1961. "A laboratory Manual of Milk Inspection". Pub. by Asia publication House India .

(A.O.A.C.), Association of Official Analytical Chemists. 2000. Official Methods of Analysis of Association of Official

Agriculture Chemists. Wisconsin: George Banta Co. Inc.

Badawi, R. M. 1998. Effect of fat mimetics on low-fat Ras cheese quality. Minofiya J. Agric. Res. 23 : 1601 – 1618.

Badawi, R. M., and K. M. K. Kebary. 1998. Influence of fat replacers on the quality of low fat Tallaga cheese. 7 th. Egyptian Conf. Dairy Sci.& Technol., pp. 347-365.

Banks, M. 1990. Improving cheese yield by the incorporation of whey protein. Dairy Industries International 55 (4) : 37 – 41 .

Banks, J. M., E. Y. Brechany, and W. W. Christie. 1989. The production of low fat Cheddar type cheese. J. Society Dairy Technology 42 (1) : 6-9.

Bohme, H. M., F. D. Mellett, L. M. T. Dicks, and D. S. Basson. 1996. Production of salami from ostrich Meat with strains of *Lactobacillus sake, Lactobacillus curvatus* and *Micrococcus sp.* Meat Sci. 44(3): 173-180

Degouy, E. 1993 . The low fat cheese challenge . Dairy Industries International 58 (10): 41-43 .

Deibel, R. H., and J. A. Lindquist. 1981. General food microbiology laboratory manual. Burgess publishing company / ALPHA EDITIONS, Minneapolis, Minnesota U.S.A (c.a. Hanafy and Farrag (1995). Assiut J. Agric. Sci. 26(3):59-66).

El-Gazzar, F. E. 1979. Studies on the enhancement of white soft cheese (Domiati cheese) ripening. M. Sc. Thesis, Faculty of Agriculture, Assiut University.

El-Gazzar, F. E. 1983. Studies on the proteins of milk and some dairy products. Ph. D. Thesis, Faculty of Agriculture, Assiut University.

El-Sayed, N. H., B. A. Effat, and M. N. I. Magdoub. 1993. Lactic culture role in Ras cheese ripening. Egyptian J. Dairy Sci. 23: 163 - 170.

Ewings, K. N., R. E. Oconnor, and G. E. Mitchel. 1984. Proteolytic microflora of refrigerated raw milk in South East Queensland. Australian J. Dairy Technol. 39: 65-68.

Fahmy, M. A., 2003. Effect of using different starters on the chemical, bacteriological and sensory properties of Ras cheese. Assiut J. Agric. Sci. 34 : 241 -253.

Giese, J. 1996 . Fats, oils and fat replacers . J. Food Technol. 50 (4) : 78- 84.

Hashem. M. I. A. 2002. Microbiological studies on milk and dairy products. Ph. D. Thesis, Faculty of Agriculture, Zagazig University.

Kebary, K. M. K., A. E. Khadar, A. N. Zedan, and S. M. Mahmoud. 1996. Acceleration ripening of

low fat Ras cheese by attenuated lactobacilli cells. Food Research International 29 :(8) 705-713.

Kebary, K. M. K., O. M. Salem, A. H. El-Sonbaty, and A. S. El-Sisey. 2002. Impact of low fat replacers on the quality of low fat Edam cheese. Egyptian J. Dairy Sci. 30 : 253– 266.

Khader, A. E., A. N. Zedan, K. M. K. Kebary, and S. F. Mahmoud. 1995. Quality of low fat Ras cheese made from heat treated milk. 6 th. Egyptian conf. Dairy Sci. & Technol., pp. 184 – 216.

Kosikowski, F. V. 1966. Cheese and Fermented Milk Foods . Edwards Brothers, Inc., Ann, Arbor, Mich.

Manual of Microbiological Methods. 1957. Society of American Bacteriologists. Pub. by McGraw-Hill Book company, New York, Toronto, London. (c.a. El-Gazzar (1979). M. Sc. Thesis, Faculty of Agriculture, Assiut University).

Marshall, R. J. 1986. Increasing cheese yield by high heat treatment of milk. J. Dairy Res. 53 : 313 – 322.

Marshall, R. T. (ed.). 1992. Standard methods for the examination of dairy products, 16 th ed. American Public Health Association, Washington, D.C.

Okasha, I. I. 2001. Effect of heat treatment and cold storage of Goat,s milk on some properties of Ras cheese during ripening . 8 th. Egyptian conf. Dairy Sci. & Technol., pp. 357 – 368.

Pearson, D. 1975. "Laboratory Technique in Food Analysis". Pub. by London and Boston, Butter worths.

Rowland, S. J. 1938. The determination of the nitrogen distribution in milk. J. Dairy Res. 9: 42-46.

SAS. 1988 . Statistical Analysis System. SAS User's. Statistics SAS Institute Inc. Editors, Cary. NC.

Vakaleris, D. G., and W. V. Price. 1959. A rapid spectrophotometric method for measuring cheese ripening. J. Dairy Sci. 47: 264- 276.

Vedamuthu, E. R., L. Hankin, Z. J. Ordal, and C. Vanderzant. 1978. Thermoduric, thermophilic, and psychrotrophic bacteria. P. 110-112. in E. H. Marth (ed.) Standrad Methods for the Examination of Dairy Products. American Public Heath Association Washington.

Walstra, p., H. J. M. Van Dijk, and T. J. Geurts. 1985. The syneresis of curd . 1. General considerations and literature review .Neth milk & Dairy J. 39 : 209-246.

Williams, S. R. 1985. Nutrition and diet therapy . Times Mirror / Mosluy , College Publishing , St . louis , toronto and stanta clara.

تحسين جودة جبن الراس منخفض الدهن.*

عبداللاه عبداللطيف عبدالله ، شاكر مصطفي الجندي ، فتحي السيد الجزار ، عصمت محمد ابرهيم

قسم الالبان – كلية الزراعة – جامعة أسيوط – مصر .

تم تصنيع جبن راس بالطريقة التقليدية من خليط من لبن جاموسي ولبن بقري . وقد تم تقييم الجبن الناتج كيميائياً وميكروبيولوجياً و حسيا لكل من الجبن الطازج والمخزن لمدة 90 يوم. و أظهرت النتائج أنخفاض الرطوبة ، الدهن ، الدهن في المادة الجافة ، النيتروجين الذائب ، معامل النيتروجين الذائب ، الاحماض الدهنية الطيارة ، التيروسين الذائب والتربتوفان الذائب انخفاضا معنويا مع انخفاض مستوي الدهن في لبن الصناعة في حين زادت الحموضة ، الملح ، الملح في السيرم ، النيتروجين الكلي والبروتين الكلي للجبن الراس الطازج زيادة معنوية بانخفاض نسبة الدهن في لبن الصناعة. كما لوحظ من النتائج أنه بتقدم فترة التسوية انخفض المحتوي الرطوبي للجبن انخفاضاً معنوياً في حين زادت الحموضة ، نسبة الملح ، نسبة الملح في السيرم ، نسبة الدهن ، النيتروجين الكلي ، النيتروجين الذائب ، معامل النيتروجين الذائب ، الاحماض الدهنية الطيارة ، التيروسين الذائب و التربتوفان الذائب زيادة معنوية. و أظهرت النتائج أن اختلاف نسبه الدهن في لبن الصناعة ليس له تأثير ملحوظ على كل من العدد الكلى للبكتيريا ، بكتريا حامض اللاكتيك ، البكتيريا التي تنمو علي درجة حرارة الثلاجة ، البكتيريا المحللة للبروتين و الخمائر و الفطريات في الجبن الراس الطازج وكذلك زادت أعداد هذه الميكروبات بزيادة فترة التسوية حتي الاسبوع الرابع ثم انخفضت واستمر ذلك حتي نهاية فترة التسوية. وعموماً لم يتم رفض أي من عينات الجبن الناتجة والمختبرة بواسطة المستهلكين.

* بحث مقدم إلى المؤتمر العلمي الثاني لشباب الباحثين بكلية الزراعة جامعة أسيوط ، 6 مايو 2008.