Evaluation of White Soft and Processed Cheese Brands Available in the Egyptian Local Market and Manufactured According to the Egyptian Standard Specification

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ABSTRACT

Adulteration may be unintentional or intentional to increase the margin of profit. Sometimes the regulations or the standard specifications of the country help those adulterators by indirect ways which lead to the appearance of adulterated and low nutritional value dairy products in the market protected by these regulations or standard specifications. In this study fifty six samples of some white soft cheese (34 samples) and processed cheese (22 sample) were collected from the local market and analyzed for chemical composition (fat%, protein%, total solids %) and starch presence. The obtained data revealed that most of samples recorded very low protein content and high fat percentage besides presence of starch in one brand of white soft cheese and in most of processed cheese. The low protein percentage in white soft and processed cheeses, as well as the high fat percentage at the expense of protein, the uses of starch to increase the total solids and also the use of hydrogenated vegetable oil and fats is an inevitable consequence of the loose items in the Egyptian standardization specification. Therefore these specifications should be reviewed and some item should be changed to achieve minimal nutritional and healthy value requested in the dairy products.

INTRODUCTION

Milk is the best and cheapest source of nutrition, and easily accepted and used by all the age groups in rural as well as in urban areas. It provide appreciable amount of protein, fats and carbohydrates in addition to a considerable amount of vitamins. These components make it an important source of nutrient required for growth in infants and children and for maintenance of health in adults.

The extensive consumption of milk and dairy products makes these foodstuffs targets for potential adulteration with financial gains for unscrupulous producers **Nicolaou *et al*. (2011).** It is very difficult to the consumer to select one food item because of misleading advertisements, improper media emphasis and food adulteration.

Adulteration may be unintentional as incident contamination which is usually due to negligence, ignorance or due to lack of good or proper facilities. Also adulteration may be intentional which is a willful act by adulterator who intended to increase the margin of his profit. Sometimes the regulations or the standard specifications of the country help those adulterators by indirect ways. The standard specification for food might be changed every few years to keep pace with the changes in the field of food industry and the emergence of some new ingredients or food additives.

The Egyptian Organization for Standards and Quality (EOS), issued many standard specifications in the area of white soft and processed cheese within the last 13 years. In white soft cheese issues standard specifications, the protein and fat content were dramatically changed from minimum protein content of 10% **(ES: 1008/2000)** to protein content might be in the range of 10% in the full cream cheese, and might be in the range of 8% in the high cream cheese **(ES: 1008/2005)**. In the same year the ESO issued new standard specification **(ES:1867/2005)** regarding the use of vegetable fat or oil in white soft cheese manufacture with the same protein parameters. In 2010, the new standard specification appeared, which abolished the protein content of the specification, but it was met by a severe intercepted which lead to its cancelation, and work continued by the previous issue (ES:1008/2005) till now.

On another scale in 2013, the updated version of the standard specification of processed cheese (ES:999, 1132/2013) appeared instead of issues (ES:999, 1132/2005). According to these issues, the producer of processed cheese has choice to use either hydrogenated or non hydrogenated fat or oils and can add any food stuffs up to 15% to raise the total solids. Also there were no limit for lactose and no minimum % of protein in cheese. These loose specifications contributed in the appearance of many types of un-nutritional and unhealthy cheeses in the local markets

Therefore, this study aimed to through a spotlight on these types of cheese through the chemical composition of these cheese varieties collected from the local markets.

MATERIALS AND METHODS

Materials

1- White soft cheese samples: Thirty four (34) white soft cheese samples (19 brands) were used in this study, two brands (sample No.1 and No.6) were obtained from the dairy unit, faculty of agriculture, Cairo University. The other thirty samples were purchased from the local markets.

2- Processed cheese: Eight brands (16 samples) of spreadable processed cheese (triangles), three of them were manufactured using milk fat, and the other five brands using vegetable oil. Another three brands (6 samples) of block processed cheese manufactured using vegetable oil. All cheese samples were purchased from the local markets.

Methods

1- Fat determination

Cheese fat was determined according to the method described by **Ling (1963)**

2- Protein determination

The total nitrogen content in both soft and processed cheese (TN%) was determined by Kjeldahl method according to **IDF (1993)**. The total protein content was calculated by multiplying the TN% by 6.38.

3- Starch detection

Starch was detected by starch- iodide test according to the method described by. **Kamthania et al. (2014)**

4- Moisture content

Moisture content was determined according to **AOAC (2005)**

5- Statistical analysis

A randomize complete block design with one factor was used for analysis protein content with three replications for each sample. The treatment means were compared by least significant difference (L.S.D.) test as given by **Snedecor and Cochran (1976)** by used assistant program.

RESULTS AND DISCUSSION

1- White soft cheese

Data in table (2) summarize the chemical composition of some cheese varieties collected from the local market in Egypt. All cheeses were analyzed for T.S., fat, protein and the presence or absence of starch. F/DM and protein /fat ratio (P/F) were calculated. From the presented data, it could be observed that all cheese samples were free from starch except one sample(No.2). Only one sample has a fat content of 12.97% while the fat content in the other samples was very high as it ranged from 21.09% to 31.84%. The F/DM value was 36.91% in one sample and was ranged from 50.59% to 72.81% in the rest of the cheese samples. Only one cheese sample was half fat cheese, three cheese samples were full fat cheese and the rest samples were high fat cheese.

Concerning the protein content in cheese, only one cheese sample has a reasonable protein value of 12.09 % while all the other cheese samples recorded very low protein content as it ranged from 2.57% to 7.98%. All protein values were less than the recommended value by the EOS (No.1008-3/2005 and No.1867/2005) which is 10% and 8% for either full fat or high fat cheese respectively.

Table 1. Mean squares of the analysis of variance for protein% in white soft cheese

Source	DF	SS	MS	F	P
Replication	2	0.231	0.1153		
Treatments	18	266.981	14.8323	95.77**	0.001
Error	36	5.576	0.1549		
Total	56	272.787			

Table 2. Chemical composition of some white soft cheese variety in local markets

Cheese type	No	Moisture	T.S	Fat	F/DM	Protein	P/F	Starch	EOS
Soft cheese	1	68.84	35.16	12.97	36.90	12.09^{A}	0.93		1008-2005
	2	54.54	45.46	31.84	70.05	4.53^{H}	0.14	+	1867-2005
Fita cheese	3	62.73	37.27	22.92	61.51	7.98^{C}	0.35		
	4	63.17	36.83	24.63	66.87	6.05^{FG}	0.25		
	5	59.64	40.36	21.09	52.26	6.99^{DE}	0.33		
	6	60.69	39.31	24.4	62.07	7.18^{D}	0.29		
Fita cheese	7	61.62	38.38	22.17	57.76	6.95^{DE}	0.31		1008-2005
(tetrapack)	8	57.29	42.71	23.61	55.27	6.53^{EF}	0.28		1867-2005
	9	58.75	41.25	27.41	66.45	5.78^{D}	0.21		
	10	59.27	40.73	27.49	67.49	5.87^{D}	0.21		
	11	61.16	38.84	23.99	61.77	5.60^{G}	0.23		
	12	60.68	39.32	24.57	62.48	5.48^{G}	0.22		
	13	59.78	40.22	27.06	67.28	3.92^{H}	0.14		
	14	67.87	32.13	25.58	79.61	2.57^{I}	0.10		
	15	60.83	39.17	26.33	67.22	5.53^{G}	0.21		
	16	60.64	39.36	23.93	60.8	5.75^{G}	0.24		
	17	65.17	34.83	23.18	66.57	3.22^{I}	0.14		

Standard protein value for (full fat cheese) was 10% and for (high fat cheese) was 8%
L.S.D value was 0.6517

By calculating the P/F ratio as recommended by the Canadian regulations which recommended the necessity to standardize the P/F ratio to be in the range of 0.86 to 0.90 in the most white cheese varieties. From the data presented in table (1), only Domiatti cheese sample matched the recommended P/F ratio as its value was 0.93. While the other samples recorded P/F ratio values far away from the recommended value as it ranged from 0.10 to 0.35 which reflect to which extent the protein content of these cheeses is very low. Statistically, there were significant differences, between most protein values in cheese samples and the recommended protein values by EOS either at 8% or at 10%. Only two samples recorded no significant difference in its protein content and were acceptable at 10% protein (sample 1) and at 8% protein (sample 3).

From the nutritional point of view one can say that the regulations done by the EOS contributed with no doubt in the increment of the amount of hydrogenated vegetable oils versus protein in the produced cheeses. So, the EOS is responsible about these un-nutritional cheeses available in the local market, therefore, the minimum protein content should be present again in the standards specification, the protein/fat ratio should be taken into consideration and when the specification allows the use of vegetable oil, it should be non hydrogenated oils.

2- Processed cheese

Data presented in table (4) shows the average chemical composition of the 22 processed cheese samples collected from the local market. It is noticeable that the spreadable cheeses made with milk fat were characterized by its reasonable protein content as compared to other spreadable cheese made with vegetable oil. Also two brands of these cheeses were free of starch. The protein % in the other vegetable cheeses ranged between 4.83% to 8.9%. Concerning the protein % in block processed cheese, one cheese sample

contained reasonable protein content 10.56% sample (No. 11) and one sample contained a very low protein content 1.64% sample (No. 10) . All processed cheeses made with vegetable oil either spreadable or block indicated the presence of starch. Fat % in processed cheeses ranged from 17.78% to 28.31%.

On matching these samples with the EOS specification it was clear that sample (No.10) didn't match the specification as the F/DM and the total solids less than 44%.

In conclusion, one can say that the lower protein content and the higher vegetable oil content are due mainly to two factors: 1- The absence of protein content from the standard specification. 2- The allowance of using vegetable oil without explicitly mentioning the non use of hydrogenated oils.

Table 3. Mean squares of the analysis of variance for protein% in processed cheese

Source	DF	SS	MS	F	P
Replication	2	0.015	0.007		
Treatments	12	231.030	19.2525	1720.91**	0.001
Error	24	0.268	0.0112		
Total	38	231.314			

Table 4. Chemical composition of some processed cheese variety in local markets

Cheese type	No	Moisture	T.S	Fat	F/DM	Protein	P/F	Starch	EOS
Spreadable (Triangles)	1	56.89	43.11	28.31	65.66	9.71^{C}	0.34		999-2013
	2	55.56	44.44	25.88	58.23	9.9^{CB}	0.38		
	3	55.85	44.15	24.45	55.37	8.85^{D}	0.36	+	
	4	53.47	46.53	24.81	53.32	7.50^{F}	0.30	+	1132-2013
	5	57.25	42.75	23.09	54.01	6.10^{H}	0.26	+	
	6	47.19	52.81	25.74	48.74	4.83^{J}	0.19	+	
	7	55.15	44.85	23.44	52.26	7.20^{G}	0.31	+	
	8	58.36	41.64	17.78	42.69	8.90^{D}	0.50	+	
Blocks	9	50.61	49.39	22.10	44.74	5.76^{I}	0.26	+	
	10	62.41	37.59	18.91	50.30	1.64^{K}	0.09	+	
	11	45.58	54.42	26.21	48.17	10.56^{A}	0.40	+	

L.S.D value was 0.1782

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