

## Comparison of different commercial cheese characteristics in Iran

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### ABSTRACT

*In this study, it was aimed to measure the physic- chemical and sensorial properties of different cheese include white, cream, cumin and mozzarella cheese that were obtained from local store. The pH, acidity, ash, calcium and phosphorus content of the samples were similar. White cheese has showed the highest protein and salt content and cream cheese has the highest fat content and organoleptic properties score, cumin cheese showed the lowest consumer acceptability.*

**Key words:** cheese, physical, chemical properties.

### INTRODUCTION

In all the word milk products have become a main part of the human diet over many years. Cheese is an important product that consumed in the word. About a third of the world's milk production is used in cheese making; it is highly valuable and nutritious product [1]. The origin of cheese is as old as that of the people's species and is related to the taming of animals 10,000 years before Christ. Some scientist is believed that cheese originated in Mesopotamia, where it was produced about 8,000 years ago and its production was experimental and accidental, occurring in the stomachs of young animals, during the transport of milk. Cheese is a popular product that soft, very-hard, unripened or ripened hard or semi-hard product which the whey/ casein protein ratio does not exceed that of original milk, formed by coagulating partly or wholly the milk protein, skimmed or partly skimmed milk, whey cream, cream, buttermilk and any combination of these component, through the protease activity of coagulating agents like rennet and by draining the whey [2]. Cheese, like many other dairy products, provides vitamins, saturated and unsaturated fat, protein, minerals, and cholesterol. Also cheese is one of the valuable sources of calcium [3]. Cheeses often expected to be a health and stable food stuff with a high shelf life [1]. The basic process for the production of all kind of cheese is similar with small changes resulting high differences in the end product. The Science or art of cheese production comprises of some main factors include, kind of milk, milk composition, moisture content, starter cultures extent, rate of acid development, ripening conditions, curd manipulation and manufacturing technology. Cheese composition varies greatly from product to product. More than 900 different kinds of cheeses are being produced in the world which is classified on the basis of their manufacturing, form, chemical composition and ripening [4]. For examples, Cream cheese, Mozzarella cheese, White cheese and Flavored cheese. Cream cheese is a high fat, deities and popular product. Its unripened, spreadable and soft cheese and its color are white through to yellow. The texture is smooth to flaky and without holes, and mixes and spreads readily with other products [5]. Mozzarella cheese has become one of the most popular food ingredient because of its use is in pizza preparation [4]. Mozzarella is an unripened and smooth elastic cheese with a high stranded parallel orientated structure without curd granules. Mozzarella cheese with a high moisture percent is a soft product with overlying layers that may form pockets containing liquid of milky texture. Also it may be packed without the liquid. It is without holes and its color is a near white. Mozzarella cheese with a low moisture level is a semi-hard or firm homogeneous product and is very suitable for shredding. This product is made by "pasta filata" technology, which consists of heating and stretching the cured until the curd is free from Lumps and will be smooth, Then the some part

of curd is cut and molded, and firmed by in freezer [6]. Mozzarella is originated in Italy. The name pasta filata related to an especial plasticizing that finished product its characteristic fibrous texture and melting characteristic [7]. In Iran, the most important kind of the cheese is white cheese that accounts for half of the cheese production in Iran [8]. According to high production and nutrition value of cheese, investigation about its properties is important. Therefore the aim of this was compare of the physicochemical characteristics properties of some different cheese in Iran.

## MATERIALS AND METHODS

### Material

Randomly selected different stores located in Tehran and 4 different kind of cheese include Cream cheese, Mozzarella cheese, and White cheese and Cumin cheese were obtained from local store. Sampling of each product accomplished according to International standard number 326 [9].

### Methods:

The pH value of samples was measured using a digital pH meter (Mettler-Toledo, GmbH; 8603 Schwarzenbach, Switzerland). PH and titratable acidity was measured according to the method of international standard number 2852 [9]. Moisture, protein and ash was measured according to the method of international standard number 637 [10], 639 and 1755 respectively [11]. Salt content was measured according to the method of international standard number 694 [11]. Calcium and phosphors was measured according to AOAC, (1990) [12].

### Data Analysis

Data collected from the aforementioned study samples were analyzed based on 0.05% coefficient of error by a software program. The data analysis was performed using MINITAB statistical software, release 14.2 (MINITAB Inc., state college, PA and USA). At first such software program proved samples normal conditions and then the significant difference among data was precisely studied via Anova-one-way test and *p*-value was determined.

### Sensory Analysis

A 5 point hedonic scale (1= lowest desirability, 5= highest desirability) was designed to evaluate the sensory characteristics by using 30 trained panelists including overall acceptability, texture, odor and taste properties. Water was provided to wash the mouth between two oral tests.

## RESULTS AND DISCUSSION

Chemical composition of different cheeses is shown in Table 1. Protein is the main component for cheeses structure and so the higher protein content of cheese related to harder texture of product. There were not any significant differences ( $p \leq 0.05$ ) between the protein content of white and cream cheese. The results are shown that the protein content of white and cream cheese significantly were higher (27.12% and 25.11%) than cumin (21.13%) and mozzarella (19.04%) cheese ( $p \leq 0.05$ ). According to national standard [13] the lowest level of protein percent for white cheese, cream cheese and mozzarella cheese were, 6 %, 5.8 % and 19.04 % respectively, and so all of samples was acceptable.

Another factor that directly affected texture of cheeses is fat content therefore cheeses with higher fat content showed softer texture. Moreover fat has the highest effect on flavor and creamy taste. The fat content of different cheeses samples were found in the range of 12.41% and 25.02%. Statistical analysis showed significant different between the fat content of samples ( $p \leq 0.05$ ). The fat content of white cheese was 27.12 % and in national standard [13] the lowest acceptable percent for white cheese is 10.25 % and so it samples was acceptable, but fat content of cream and mozzarella cheeses was 25.02 % and 22.18% respectively. According to national standard [14], acceptable limit for this two products is higher than 28% and 35% respectively, therefore both of this sample wasn't accepted. The average level of pH samples was 5.39 and it varies between 5.11 to 5.63 and statistically all of them were similar ( $p \leq 0.05$ ). According to national standard all of samples except cream cheese were in acceptable range, also cream cheese was a little higher than national standard [13].

The min value of acidity was 0.68% and all of them were similar and acceptable. Ash content of all samples statistically was similar, and its min value was 1.27%. Calcium and phosphorus is essential and important nutrients in the human diet. There wasn't any significant difference ( $p > 0.05$ ) between calcium and phosphorus content of samples. The highest content of calcium and phosphorus belonged to White cheese and was 0.71% and 0.53% respectively. Generally During the cheese making salt was added and therefore salt content is important.

White cheeses have shown the highest salt percent (0.45%) and statistically analysis showed significant difference between the salt content of white cheese as compare with other samples ( $p \leq 0.05$ ), also according to national standard [13] all of samples was acceptable.

About mozzarella cheese, similar values were reported by Sameen *et al.* (2010) [4] who reported that fat, protein, pH and acidity content of Mozzarella cheese was about 17%, 27%, 5.2 and 0.98% respectively. Ahmed *et al.*, 2011 [7] reported that the pH of Mozzarella cheese was 6.74 that it was higher than the pH of current study. These results about White cheese were in agreement with those reported by, Nour El Diam *et al.*, (2010) [15] and Owni *et al.*, (2007) [16]. Diam *et al* [15] reported that fat, protein, ash and acidity content of samples were about 13%, 19%, 2.3% and 0.76% respectively. Owni *et al.*, (2007) [16] showed that fat, protein, salt and acidity content were 22.80%, 22.50% and 1.08% respectively, but ash content of their samples were higher than current research and it was 4.78%. The white cheese results obtained by Dalvi *et al.*, (2011)[8] were a little far from this result, who reported that fat, protein, salt and ash content of salted White cheeses and were 17.07%, 11.12%, 3.14% and 3.89% respectively.

The results of sensory properties of the experimented samples were shown in Table 2. The results demonstrated that there were not any significant differences ( $p > 0.05$ ) between the odor score of samples but the score of taste, texture and total score of samples showed significantly difference ( $p \leq 0.05$ ). Cream cheese showed the highest score of texture (4.83), odor (4.00), taste (4.91) and subsequently total score (4.56). According to Table 1 Cream cheese has the highest content of fat, since fat is the main component that affected on taste and flavor, these results were expected. The lowest score refer to Cumin cheese; it means this product had lowest consumer acceptability.

**Table 1: physicochemical properties of different kind of cheeses**

Properties (%)	White cheese	Acceptable standard	Cream Cheese	Acceptable standard	Cumin cheese	Acceptable standard	Mozzarella cheese	Acceptable standard
pH	5.20±0.06 <sup>a</sup>	Max 5.20	5.11±0.00 <sup>a</sup>	4.5 - 5	5.62±0.01 <sup>a</sup>	5.5- 6	5.63±0.02 <sup>a</sup>	5 - 5.8
Acidity	0.90±0.05 <sup>a</sup>	0.5 - 2.5 %	0.72±0.04 <sup>a</sup>	Max 1%	1.02±0.07 <sup>a</sup>	-	0.80±0.08 <sup>a</sup>	Max 0.8 %
Fat	12.41±1.06 <sup>d</sup>	Min 10.25	25.02±0.96 <sup>a</sup>	Min 28 %	19.14±1.20 <sup>c</sup>	-	22.18±1.12 <sup>b</sup>	Min 35 %
Protein	27.12±1.35 <sup>a</sup>	Min 6%	25.11±2.37 <sup>a</sup>	Min 5.8 %	21.13±1.65 <sup>b</sup>	-	19.04±0.96 <sup>b</sup>	Min 17%
Ash	1.51±0.07 <sup>a</sup>	-	1.01±0.08 <sup>a</sup>	-	1.45±0.10 <sup>a</sup>	-	1.13±0.05 <sup>a</sup>	-
Calcium	0.71±0.01 <sup>a</sup>	-	0.49±0.03 <sup>a</sup>	-	0.61±0.08 <sup>a</sup>	-	0.51±0.05 <sup>a</sup>	-
Phosphorous	0.53±0.03 <sup>a</sup>	-	0.42±0.05 <sup>a</sup>	-	0.52±0.02 <sup>a</sup>	-	0.44±0.01 <sup>a</sup>	-
salt	0.46±0.02 <sup>a</sup>	Max 4 %	0.22±0.04 <sup>b</sup>	Max 1.5 %	0.24±0.03 <sup>b</sup>	Max 1 %	0.23±0.06 <sup>b</sup>	Max 1 %

**Table 2: sensory properties of different kind of cheeses**

Sensory properties	White cheese	Cream cheese	Cumin cheese
Odor	3.97±1.09 <sup>a</sup>	4.00±0.98 <sup>a</sup>	3.20±0.41 <sup>a</sup>
Taste	4.01±0.07 <sup>a</sup>	4.91±0.42 <sup>a</sup>	3.02±0.42 <sup>b</sup>
Texture	4.20±0.34 <sup>a</sup>	4.83±0.08 <sup>a</sup>	4.11±0.51 <sup>a</sup>
Total Score	4.60±0.42 <sup>a</sup>	4.56±0.12 <sup>a</sup>	3.44±0.08 <sup>b</sup>

## CONCLUSION

According to this result white cheese shows the highest protein content and the lowest content of fat therefore it is expected that this product had hardest texture and structure and also recommended for loss weight diet. Cream cheese has the highest content of fat, and consumer acceptability and in contrast the Cumin cheese showed the lowest acceptability.

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