

# Standardized of Milk is the Importance Factor to Economization Produced Cheese Mozzarella from Cow's Milk

Dr. Sc. Shurki Maxhuni <sup>a\*</sup>, Dr. Sc. Candidat Almir Abdurramani. <sup>b</sup>

<sup>a</sup>University "Ukshin Hoti", 20000, Prizren, Kosova

<sup>b</sup>Milk Industry "Elona" Fushë Kosovë 10000 Kosova

## Abstract

Milk used for cheese making is normally standardized and heat treated. In some case, milk is homogenized. Milk has great economic importance, particularly its cheese processing. Therefore, we made and experiments with cow's milk not standardized and standardized to make and comparison of economic parameters. Standardization of milk (3.2% fat) is one of the main factors of the economic aspect. This paper deals with: Comparison of standardized milk used for the manufacture of mozzarella cheese with milk without standardized (4.1%) by comparing the results obtained, after research and analyses of physical-chemical peculiar feature of milk. We have followed the processes from drying of cheese until preparing it for market, physical-chemical peculiar feature. We carried out three experiments for each milk-kind. For every experiment, we took three patterns and analyzed. Production of this sort of cheese, the application of producing technology and the supply of Kosova's trade market with mozzarella cheese produced from cow's milk is the objective of this presentation work research.

**Keywords:** Cow; milk; coagulum; cheese; whey; mozzarella.

## 1. Introduction

Milk is a complete food and cheaper to man - SAMPURNA AHAAR (complete feed). Milk is a white liquid produced by the mammary glands of mammals. It is the primary source of nutrition for young mammals before they are able to digest other types of food.

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\* Corresponding author.

Early-lactation milk contains colostrums, which carries the mother's antibodies to its young and can reduce the risk of many diseases [1]. Milk contains many other nutrients and the carbohydrate lactose. The role of milk in nature is to nourish and provide immunological protection for the mammalian young [3].

Legend has it that mozzarella was first made when cheese curds accidentally fell into a pail of hot water in a cheese factory near Naples and soon thereafter the first pizza was made! Actually, new cheeses are often formulated when mistakes happen, so there well may be truth in the tale. In Italy, recently legislation has been introduced to restrict use of term "Mozzarella" only to those products exclusively made from buffalo milk [2].

Cheese production has three steps: curd formation, curd treatment and curd ripening.

1. Curd important product of fermentative lactic acid bacteria [8].

2. Curd treatment consists of condensing and squeezing to form dense, hard curd.

It is then molded into the desired shape, salted and mixed with different types of secondary micro flora [5].

3. Secondary micro flora ripens the cheese and will determine the final texture and aroma of each type of cheese [4].

Mozzarella can be smoked, either in a smoking chamber with intense smoke or by "painting" with a liquid smoke. The curds can be mixed with fresh herbs or chili peppers before forming to flavor the mozzarella. The possibilities and variations are endless [9]. The perish ability of fresh mozzarella varies according to packaging. Vacuum sealing extends the shelf life dramatically [7].

## **2. Materials and Methods**

### **2.1. Materials – Cow's milk**

For the production of Mozzarella Cheese we have used cow's unpasteurized milk (4.10% fat) of the following breeds: autochthon Metise (Busha &Holstein) in the dairy of the region of Fushë Kosova, in milk industry "Bylmeti". We carried out three experiments for each milk-kind. For every experiment, we took three patterns and analyzed the physical – chemical. The calculation was appraised statistically. We have followed the processes from drying of cheese until preparing it for market, physical-chemical peculiar feature.

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### **2.2. Work methods**

For analyzing physical-chemical milks and cheese are used these international standard methods.

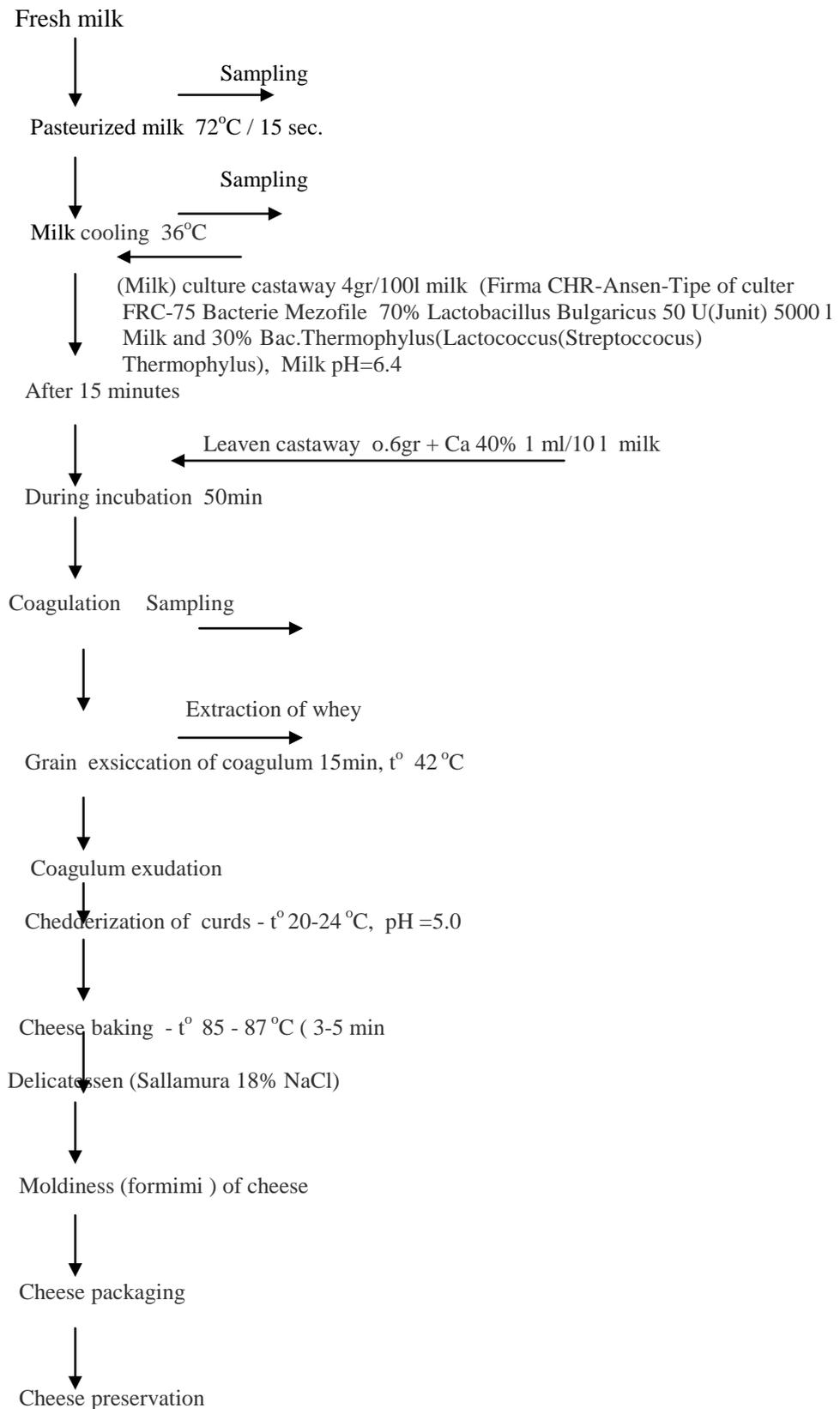
1. For definition of pH value were used the ph-meter ISOLAB pH -111,
2. Soxhelt-Henkels method were used to define sour taste,
3. For Physical – chemical is utilized LACTOSCAN – D -90,
4. For definition of Nitrogen (N) were used the Kelda’s method,
5. For definition of fat percentage % were use the method of Gerber,
6. for definition of dry matters until drying up of constant mass,
7. Dry quantity of mass without fat has been done in calculated way,
8. Percentage of fat at dry mass has been done in calculated way,
9. Water quantity has been done in calculated way,
10. For definition of saline’s (NaCl),
11. Ash% [6].

**3. Physics chemical analysts from cow’s milk non standardized**

**Table.1:** Physics chemical analysis from cows milk non standardized

<b>pH</b>	<b>6.44</b>
<b>Acidities °SH</b>	<b>7.0</b>
<b>Temp. Sample</b>	<b>18.3</b>
<b>Fat %</b>	<b>4.10</b>
<b>SNF %</b>	<b>8.54</b>
<b>Density</b>	<b>1.02600</b>
<b>Protein%</b>	<b>3.48</b>
<b>Lactose%</b>	<b>4.51</b>
<b>Added Water%</b>	<b>0.41</b>
<b>Solids %</b>	<b>0.71</b>
<b>Freezing Point</b>	<b>- 0.540</b>
<b>Conductometria -mS/cm</b>	<b>4.57</b>

### Diagram for production for mozzarella cheese



**4. Percentage of Cows Cheese produced from standardized milk with 3.2% of fat**

**Table.2:** Percentage of Cows Cheese produced from standardized milk with 3.2% of fat

<b>pH</b>	<b>4.95</b>
<b>°SH</b>	<b>50.66</b>
<b>Fat %</b>	<b>19.36</b>
<b>Materie such %</b>	<b>68.53</b>
<b>General N %</b>	<b>2.17</b>
<b>General proteine %</b>	<b>39.37</b>
<b>Solids (NaCl) %</b>	<b>5.03</b>
<b>SNF %</b>	<b>29.81</b>
<b>% Fat in SNF*</b>	<b>10.41</b>
<b>Water %</b>	<b>31.47</b>

**Table.3:** Physico-chemical parameters of cow's curd - Cheddarization

<b>pH</b>	<b>6.10</b>
<b>°SH</b>	<b>20.29</b>
<b>Fat %</b>	<b>21.20</b>
<b>Materie such %</b>	<b>41.85</b>
<b>General N %</b>	<b>2.36</b>
<b>General proteine %</b>	<b>15.05</b>
<b>Solids %</b>	<b>1.25</b>
<b>Ash %</b>	<b>1.99</b>
<b>SNF %</b>	<b>33.13</b>
<b>% Fat in SNF</b>	<b>50.65</b>
<b>Water %</b>	<b>58.15</b>

**5. Percentage of Cows Cheese produced from non-standardized milk 30 days**

**Table.4:** Percentage of Cows Cheese produced from non standardized milk 30 days

<b>pH</b>	<b>5.58</b>
<b>°SH</b>	<b>22.6</b>
<b>Fat %</b>	<b>22.00</b>
<b>Materie such %</b>	<b>45.67</b>
<b>General N %</b>	<b>2.72</b>

<b>General proteine %</b>	<b>17.35</b>
<b>Solids %</b>	<b>1.49</b>
<b>Ash %</b>	<b>2.11</b>
<b>SNF %</b>	<b>23.67</b>
<b>% Fat in SNF</b>	<b>48.17</b>
<b>Water %</b>	<b>54.33</b>

\*SNF (Solids – not – fat) = proteins, lactose, minerals, acids, enzymes, vitamins

### 6. Organoleptic indicators for assessing Mozzarella cheese made from cow's milk

**Table.5:** Organoleptic indicators for assessing Mozzarella cheese made from cow's milk

Ingredients	Number of points	
	Assessment	Maximum
<b>Externals</b>	<b>3</b>	3
<b>Color</b>	<b>2</b>	3
<b>Consistency</b>	<b>2</b>	3
<b>Cutting</b>	<b>2</b>	3
<b>Smell</b>	<b>2</b>	3
<b>Taste</b>	<b>7</b>	10
<b>Total number of points</b>	<b>19</b>	25

### 7. Conclusions

Average the fat in that of cows 4.10 %. The SNF – (Solids – not – fat = proteins, lactose, minerals, acids, enzymes, vitamins) in cow’s 8.54%. Protein in cow’s milk 3.48%. The Lactose in cow’s milk 4.51%. The Solids in cow’s milk is 0,71. The Freezing points in cow’s milk is -0,540. The conductometrie in cow’s milk is 4,57.

Color of cow’s milk is creamy, with smooth creamy texture. Color of milk is a blend of individual effects produced by:

Colloidal calcium caseinate/phosphate particles and dispersed/emulsified fat globules, both of which scatter light.

Carotene (to some extent xanthophylls), which imparts a yellowish color.

The greater intake of green feed, results in deeper yellow color of cow milk. Larger fat globules and higher fat

percentage also results in increased intensity of yellow color. Upon heating whiteness increases due to increased reflection of light by coagulate. Skim milk has a bluish and whey a greenish yellow color (due to presence of riboflavin), riboflavin (vitamin B2) and potassium. Allergy to cow's milk has been found in many people with conditions such as recurrent ear infections, asthma, eczema, and even rheumatoid arthritis.

Studies on the composition and technological properties of the cow's milk showed that they have the necessary qualities for use in cheese production.

The most significant advantage of the composition is relatively high dry matter content of the cow's milk, which take place mainly protein and fat.

Significant in terms of direction curd species is the ratio of milk protein and fat. This ratio in the studied species of milk produced in Kosovo is beneficial to obtain Mozzarella cheese. Major shortcoming of the milk of Kosovo is the highest micro bacterial content (1,000,000 – 1,500,000 m.o/ml), which is not shown the presence of pathogenic bacteria, but high microbial content of different, but do not allow pathogenic micro flora without standing this shortcoming to give in the production of cheese. Mozzarella cheese to a direction, in this case is a more favorable direction, because the thermal regimes, which undergoes milk and dough cheese enough to ensure destruction of vegetative micro flora and forms part of the disputes.

Physico-chemical parameters of cow's curd between the cheeses has no major change. The structure and texture of the cheese from cow's milk is not so elastic and stretchy.

Cow's cheese is c white, which is favored in Mozzarella; there is a thin crust and fine taste. When cut, capillaries separated from his body fluid albumen / quaking grass and flavor of milk fermentation. Easily formed in the circular forms of bites and shallow with a glossy surface. Curd cheddarization received by them very well and gets in hot water treatment in the 80-85<sup>0</sup>C plasticity necessary for the formation of the type of Mozzarella cheese. For this success can be recommended dairy practices in insufficient quantity of buffalo milk is used in part or in whole cow's milk.

Color of cheese produced from standardized cows milk is Creamy, with Texture of cheese Less smooth and Taste of cheese Salty.

Color of cheese produced from not standardized cows milk is more Creamy, with Texture of cheese smooth and Taste of cheese mor Salty.

Important economic indicator is the yield of cheese

1 kilograms Mozzarella cheese is produced from 8.5 liters of cow's milk. Particularly important result is the difference in yield of cheese from non-standardized and standardized milk.

Based on data from the studies on Mozzarella cheese and milk from cow can be made the following.

1. Cow's milk produced in Kosova have the necessary physical-chemical and technological parameters for

obtaining the Mozzarella cheese. 1.1. Total dry matter content in milk produced in Kosova favors its effective use for cheese production. 1.2. Milk fat is relatively high: average season: cow's milk – 4.10%;

1.3. SNF- dry residue / protein, lactose, minerals, organic acids, enzymes, vitamins in cow's milk 8.54%.

1.4. Protein content of the three types of milk tested is relatively high: average annual by cow's milk is 3.48%.

1.5. Lactose in cow's milk is 4.51%. 1.6. Soli in Cow's milk is 0, 71.

2. Physic-chemical parameters of milk Kosova are optimal for use in cheese production.

2.1. The total titratable acidity of cow's milk is 7,0<sup>0</sup>SH.

2.2. The active acidity / pH / of cow's is pH 6.44 – 6.45

2.3. Freezing Point of buffalo milk is higher, followed by cow's and goat's milk;

2.4. Conductometria of buffalo milk is approximately equal to the buffalo, cow and goat milk;

3. Oreganoleptic parameters – color, structure, consistency are in the standards in the manufacture of Mozzarella cheese.

4.1. Enzyme form with coagulum suitable for cheese rheological properties – density, elasticity, sinerezis, are in the standards parameters by cow's milk.

4.2. It was found that cheddarization of cheese test is optimal for the three species studied in the range of milk – pH 5.0 – 5.2;

4.3. With heat treatment of curd-cheese saline solution in achieving the required effect and pasteurization plasticity of cheese solution at a temperature of 80 – 85<sup>0</sup>C for 1, 0 – 1, 5 min;

4.4. Losses of dry substances in hot water should not exceed 1.5 – 2.0% of dry matter of cow's for the loss of fat;

5. It was found that Mozzarella cheese from cow's milk is characterized by standards physical-chemical and organoleptic parameters – color, taste, aroma, texture.

6. Qualitative characteristics of Mozzarella cheese made from cow's milk give reason to recommend to the practice partly or completely substitute for buffalo milk.

1 kilograms Mozzarella cheese is produced from 8.5 liters of cow's milk.

Particularly important result is the difference in yield of cheese from non-standardized and standardized milk.

Mozzarella cheese yield increased by 1.7% in the use of standardized buffalo milk fat with an average 6.5 percent.

Based on exploratory data for production of Mozzarella cheese from un-standardized milk from cow's milk by this we can conclude that:

Counsel for practice – For the maturity

It is of greater importance that there is not of economic profitability to produce

Mozzarella cheese from un-standardized milk.

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If we wish to produce cheese from Cow's milk with 4.1% of fat, we will have cheese with 22% of fat in cheese.

- a). If we wish to produce cheese from Cow's milk with 3.2% of fat, we will have cheese with 21% of fat.
- b). Percentage alteration of fat in cheese at un-standardized Cow's milk (22%) and standardized milk (21%) is 1% more.
- c). Percentage of un-standardized fat 22 % : 4.1% = 5.36 % more.
- d). Standardized per centered of fat 21% : 3.2% = 6.56 % more.
- e). Alteration between 6.56 : 5.36= 1.22 times more.
- f). Standardized Cow's milk is 1.22 % more profitable then un-standardized milk
- g). we have 1.22 % more percentage loss of fat in cheese with un-standardized milk.

Percentage loss of fat in whey of un-standardized cow's milk during the production process of mozzarella is 1.22%.

Meanwhile, percentage of fat in whey depends from standardized kind of milk which is from 0.50 – 75% of fat.

Though the results of this particular examination are quite good, we would recommend a 175emperature raise of 2°C, from 85 °C to 87 °C for a 2-3 minutes period of the pasteurization of the curd coagulant.

During the production of the mozzarella cheese we had at disposal the proper conditions, but the conditions in Kosova in general are not favorable for the production of this type of cheese with regard to the registered microbiological indicators of the fresh milk.

It is crucial that the Kosova government takes measures for enacting laws and drafting administrative regulations and instructions for creating good conditions for the farmers so that the milk has fewer microorganisms and meets the European standards.

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