**Standardezed of milk is the Importance factor to economization produced cheese mozzarella from cow’s milk**

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**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.

**INTRODUCTION**

Milk is a complete food and cheaper to man - SAMPURNA AHAAR (complete feed). Milk is a white liquid produced by the [mammary glands](https://en.wikipedia.org/wiki/Mammary_gland) of [mammals](https://en.wikipedia.org/wiki/Mammal). It is the primary source of [nutrition](https://en.wikipedia.org/wiki/Nutrition) for young mammals before they are able to [digest](https://en.wikipedia.org/wiki/Digestion) other types of food. Early-[lactation](https://en.wikipedia.org/wiki/Lactation) milk contains colostrums, which carries the mother's [antibodies](https://en.wikipedia.org/wiki/Antibody) to its young and can reduce the risk of many diseases. Milk contains many other nutrients and the carbohydrate [lactose](https://en.wikipedia.org/wiki/Lactose). The role of milk in nature is to nourish and provide immunological protection for the mammalian young **(Row milk, Maxhuni, 2013).**

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 **(Cheese Rheology and Texture, M.Mehmet Ak. P.cm.@2003).**

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

**1.** Curd important product of fermentative lactic acid bacteria. (**Mozzarella di Bufala.org, 2006).**

**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.

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

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 **(India Diry;Mozzarella di Bufala.org , Italian version Copyright 2006).** The perish ability of fresh mozzarella varies according to packaging. Vacuum sealing extends the shelf life dramatically, **(Mozzarella Dallas Texas).**

**Work Material -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.

We carried out three experiments for each milk-kind. For every experiment, we took three patterns and analyzed the physical – chemical parameters.

The calculation was appraised statistically. In fact, the best area to produce Mozzarella cheese Buffalo’s non-standardized milk.

**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 – chemicalis 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%, (IDF Standard 17 A, 1972).

**(IDF Standard 17 A, 1972).**

Table.1. Physico chemical analisys from buffalos

milk non standardezed

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

Diagram for production for mozzarella cheese

Fresh milk

Sampling

Pasteurized milk 72oC / 15 sec.

Sampling

Milk cooling 36oC

(Milk) culture castaway 4gr/100l milk (Firma CHR-Ansen-Tipe of culter

FRC-75 Bacterie Mezofile 70% Lactobacillus Bulgaricus 50 U(Junit) 5000 l

Milk and 30% Bac.Thermophylus(Lactococcus(Streptoccocus)

Thermophylus), Milk pH=6.4

After 15 minutes

Leaven castaway o.6gr + Ca 40% 1 ml/10 l milk

During incubation 50min

Coagulation Sampling

Extraction of whey

Grain exsiccation of coagulum 15min, to 42 oC

Coagulum exudation

Chedderization of curds - to 20-24 oC, pH =5.0

Cheese baking - to  85 - 87 oC ( 3-5 min)

Delicatessen (Sallamura 18% NaCl)

Moldiness (formimi ) of cheese

Cheese packaging

Cheese preservation

Table.2. Percentage of Cows Cheese produced from standardized

milk with 3.2% of fat

|  |  |
| --- | --- |
| **pH** | **4.95** |
| **oSH** | **50.66** |
| **Fat %** | **19.36** |
| **Materie such %** | **68.53** |
| **General N %** | **2.17** |
| **General proteine %** | **39.37** |
|  |  |
| **Solids (NaCl) %** | **5.03** |
| **SNF %** | **29.81** |
| **% Fat in SNF\*** | **10.41** |
| **Water %** | **31.47** |
|  |  |

Table.3. Physico-hemical parameters of cow’s curd - Cheddarization

|  |  |
| --- | --- |
| **pH** | **6.10** |
| **oSH** | **20.29** |
| **Fat %** | **21.20** |
| **Materie such %** | **41.85** |
| **General N %** | **2.36** |
| **General proteine %** | **15.05** |
| **Solids %** | **1.25** |
| **Ash %** | **1.99** |
| **SNF %** | **33.13** |
| **% Fat in SNF** | **50.65** |
| **Water %** | **58.15** |

Table.4. Percentage of Cows Cheese produced from

non standardized milk 30 days

|  |  |
| --- | --- |
| **pH** | **5.58** |
| **oSH** | **22.6** |
| **Fat %** | **22.00** |
| **Materie such %** | **45.67** |
| **General N %** | **2.72** |
| **General proteine %** | **17.35** |
| **Solids %** | **1.49** |
| **Ash %** | **2.11** |
| **SNF %** | **23.67** |
| **% Fat in SNF** | **48.17** |
| **Water %** | **54.33** |

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

Table.5. Organoleptic indicators for assessing Mozzarella cheese

made from cow's milk

|  |  |  |
| --- | --- | --- |
| Ingredients | Number of points | |
|  | Assessment | Мaximum |
| **Externals** | **3** | 3 |
| **Color** | **2** | 3 |
| **Consistency** | **2** | 3 |
| **Cutting** | **2** | 3 |
| **Smell** | **2** | 3 |
| **Taste** | **7** | 10 |
| **Total numer of points** | **19** | 25 |

**Results and Discusion**

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-hemical 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 chedderization received by them very well and gets in hot water treatment in the 80-850C 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

**Conclusions**

**The main factor of the economic aspect for the manufacture of mozzarella cheese is the standardization of milk for cheese production** **with 3.2% fat.**

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 0SH.  
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 chedderization 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 – 850C 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.

It is of greater importance that we have not of economic profitability to produce cheese from un-standardized milk.

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 temeprature raise of 2oC, from 85 oC to 87 oC 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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