



## Curd production from Cow's milk to produced mozzarella cheese with Traditional method

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### Abstract:

*Undoubtedly, the quality of fresh milk in the production of cheese plays an important role in the quality of cheese. In this context, the quality of milk coagulum production for the production of cow's mozzarella cheese plays an important role in the quality of cheese.*

*Curd quality production, is of special importance to produce a cheese with the proper quality. In order to discover the importance of economic production Curd from fresh cow's milk without standardized with 4.10 % fat, in Dairy "Bylmeti" in Fushë Kosovë. Physical and chemical analyzed milk and cheese according to international standard methods. Analyzes are made for setting the exact percentage of fat in the dough Curd acquired from unstandardized milk and is made calculative profit calculation of the percentage of fat in the dough Curd. We made three experiments with 500 l of milk from each production of curds. We get from three samples for analysis physical and chemical properties. We have taken 48 samples of milk and 48 samples of curds, where we analyzed the physical and chemical properties of all 96 samples.*

**Keywords:** Milk, cow's, curd, whey, unstandardization.

### Preface

Milk is the only food for mammals, the baby in the first period to give milk containing lifetime. Material energy and building materials needed for the baby's growth. Contains antibodies that protect the baby from infections mammal. Milk is a complete food and cheaper to man - SAMPURNA AHAAR- complete feed. (2).

Milk has been a source of food of people since prehistoric times now. The milk animals (cows, sheep's, goats, buffalos), which we know today have been cultivated from the wild animals, which have been living through the millennia at various altitudes and latitudes and have been exposed to natural conditions, sometimes being inclement and severe. (7).

Milk is considered as a complete and ideal food and it contains most of the proximate principles of a well balanced diet. Milk of various mammals is used for food but cow's milk is being used throughout out the world for feeding infants and as a supplement to the diets of the children and adults. The other animal's milk used is buffalo, goat, sheep, and camels. This nutrient packed drink is given to patient even during critical stage. Various milk products such as curd, butter milk, ghee, cheese, pannier, khoya, rabri etc are used commonly in our food preparations. This time tested nutritious drink is been criticized by few vocal people to the extent that milk is equated to poison. (3&4&5).

Many animals create milk, but milk used in commercial cheese making generally comes from cows, sheep, and goats. Some varieties of cheese are made with water buffalo, yaks, moose, and reindeer. To make cheese, the environmental conditions of the milk must change to facilitate a chemical reaction. As a result of the reaction, milk is separated into two parts: **curds** (solid) and **whey** (liquid). This stage is common to all cheese making, and it's a great place to evaluate which milks are best to make cheese with. Some people stop at this point and enjoy eating the curds, or they process it further and create a block or ball of cheese to enjoy. (14)

### **How to manufacture cow's curd to produce mozzarella cheese**

The best way to get a good artisan mozzarella with the original flavor and aroma is to manufacture it with natural whey culture. However you can also have good results with other types of starter (freeze-dried or milk starter).

Processing steps of the mozzarella's manufacturing:

#### **1. Preparation of milk**

Cow's milk is thermized or pasteurized and placed in stainless steel vat, in which the other ingredients are mixed in  $72^{\circ}\text{C}$  / 15 sec.

The amount of culture or whey used in the processing of cow's milk mozzarella is much lower than that used for buffalo mozzarella, which requires a stronger acidification. The dose of freeze-dried culture is usually specified by the manufacturer, on the contrary in case you use the whey culture you must add a suitable amount, generally not exceeding 1%, to get an optimal ripening time of the curd within 4 or 5 hours. (7&12)

#### **2. Coagulation process**

First you need to heat the milk up to  $36-38^{\circ}\text{C}$  and then you can add the rennet to it, making sure to mix it thoroughly in the mass. The dose of rennet must be suitable to obtain a compact curd approximately in 1 hr. Generally, with a rennet of title 1:10.000, the proportion may vary from 25 to 35 ml / hl according to the quality of the milk ( milkculture castaway 4gr/100l milk (Firma CHR-Ansen-Tipe of culter

FRC-75 Bacterie Mezofile 70% Lactobacillus Bulgaricus 50 U(Junit) 500 l milk and 30% Bac.Thermophylus(Lactococcus(Streptococcus) Thermophylus), Milk pH=6.4

#### **3. The breakage of the curd**

The following steps are the breakage of the curd, which needs to continue until obtaining little lumps of hazelnut size, and then a resting phase of approx. 30 minutes to allow the curd to settle and to consolidate on the bottom of vat.

#### **4. Ripening of the curd**

First you need to remove the whey that lies on the curd. Later you must cut the curd into blocks with a side of approx. 30 cm and leave it to ripen immersed in the whey that still flows out of the mass. It is important that you make sure that its temperature does not drop below  $32-34^{\circ}\text{C}$  in order to avoid the slowdown of the bacterial activity.

The ripening of the curd must be kept under control through various pH measurements until reaching a pH value of 5.0 to 5.2 (pH of stretching), and / or performing the stretching test. (7&12)

The milk is incubated with a whey starter containing thermophilic bacteria. Then rennet is added to form the curds. The curds are heated in water or whey until they form strings (hence the term "string cheese") and become elastic in texture. The curds are stretched, kneaded until smooth, and then formed into round balls to make fresh mozzarella cheese.(7&12)

Nowadays more than 2000 cheese varieties have been produced worldwide. (9)

### Materials and Method

It's used fresh milk with 4.10 % of fat to produce curd for produced mozzarella cheese from cow's milk with these parameters. For physical- chemical peculiar feature of milk and Mozzarella samples were used these methods:

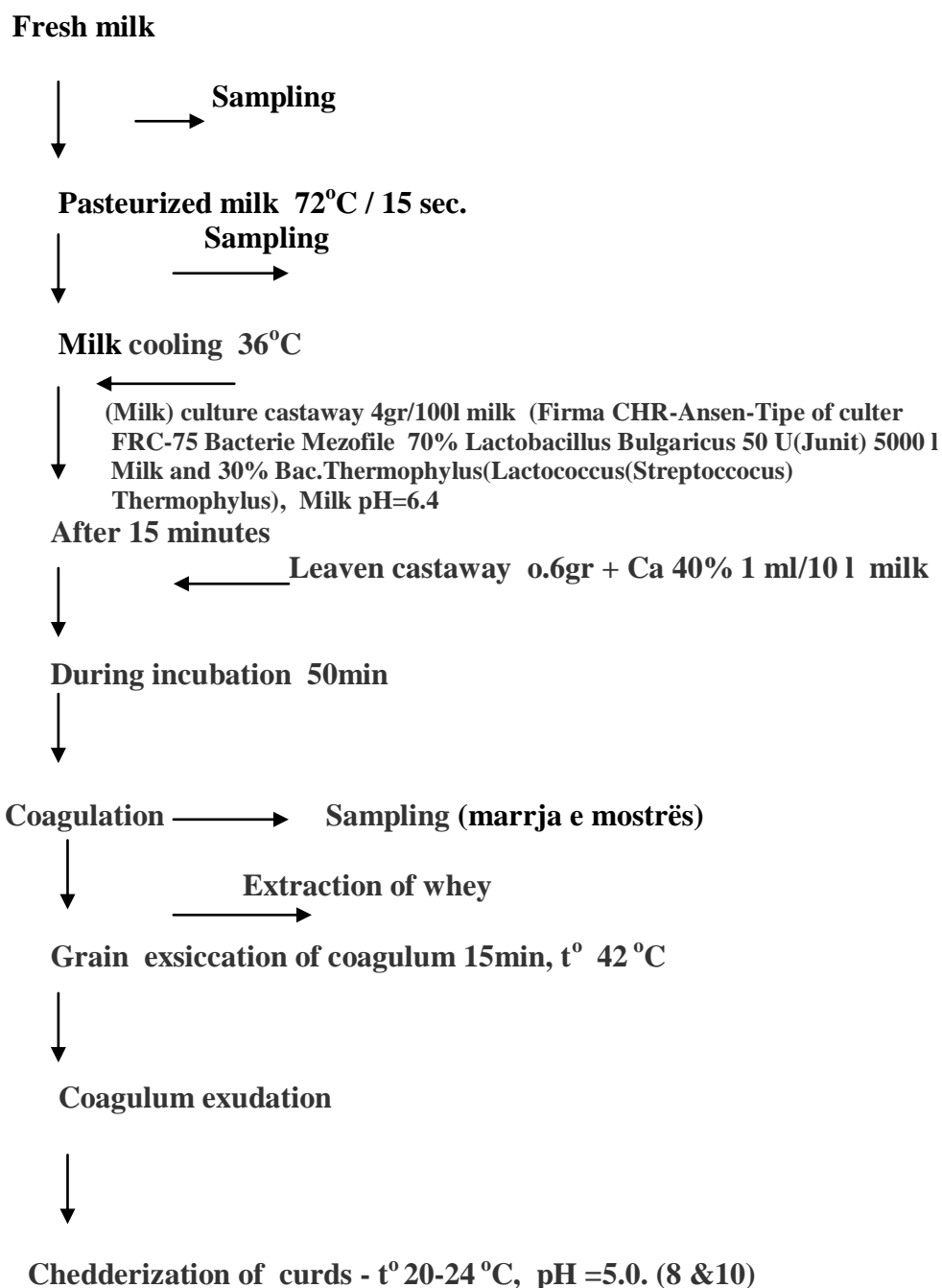
For physical-chemical peculiar feature of milk and curd samples were used these methods:

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

**Table 1: Average from Cow's fresh 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>

**Processing diagram of Curd Mozzarella cheese produced from cow's milk,  
with Traditional method**



Curd to produce cheese start off with fresh milk, obtained by coagulating milk in a process called curdling. The milk is pasteurized, much like in the process of creating cheese. During this process, rennet is added to clot the milk. The coagulation can be caused by adding rennet or any edible acidic substance such as lemon juice or vinegar, and then allowing it to sit. (6)

The increased acidity causes the milk proteins (casein) to tangle into solid masses, or *curds*. Milk that has been left to sour (raw milk alone or pasteurized milk with added lactic acid bacteria) will also naturally produce curds, and sour milk cheeses are produced this way. Producing cheese curds is one of the first steps in cheese making. (1)

Curd is obtained by bacterial fermentation of buffalo milk. In this process lactose in buffalo milk is

converted into lactic acid using several micro-organisms. The species involved in the fermentation include *Lactococcus lactis*, *Streptococcus diacetylactis*, *Streptococcus cremoris*, *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus*. (4)

Curd can be made in both traditional and industrial forms. Traditionally milk is filtered and boiled, the scum is removed and it is cooled to room temperature. A few spoonfuls of a previous batch of curd are added and it is then mixed well and poured into clay pots. These are sealed by wrapping a piece of paper over the pot and allowing it to stand for 12 hours. Traditionally curd (buffalo curd it's thicker and tastier and has a higher fat content than cow's curd) is made from filtered and boiled buffalo milk. The milk (usually from cows or water buffalo) is warmed and curdled and allowed to rest for an hour before the curds are cut into small pieces and the whey is drained off. The curds are allowed to rest for a number of hours. (3&6)

The curds can be mixed with fresh herbs or chili peppers before forming to flavor the mozzarella. The possibilities and variations are endless. The perishability of fresh mozzarella varies according to packaging. Vacuum sealing extends the shelf life dramatically. (13)

## RESULTS AND DISCUSSION

Without curds, you cannot make a good cheese. While making your cheese curds, try to answer the following questions:

- How do differences in milk composition (fat, protein, and sugar) affect cheese curd formation?
- What components of milk end up in the cheese curds?

To test how milk composition affects curd formation, you could use milk from different animals, although it's sometimes hard to find a variety of animal milk types at the grocery store.

The fat content of milk affects curd formation. While fat plays a big role in the taste and consistency of the cheese, proteins also play a crucial role in cheese making. Both the curds and the whey contain proteins. In dairy milk, **casein** (KAY-seen) is a family of proteins that coagulate around lactose and fat in the milk and solidifies to form the cheese curds. So, why does casein solidify and produce curds while other proteins don't?

It has to do with the unique properties of different proteins. All proteins are molecules made of a chain of smaller molecules called amino acids. Proteins have unique shapes and chemical properties based on the sequence of amino acids that are used to make them. The shape of a protein is determined by the order of its amino acids, and it ultimately affects the function of that protein. Casein proteins deliver minerals like calcium and phosphorus, which baby animals need to grow.

In a regular glass of milk, complexes of casein proteins called **micelles** are floating around. These complexes are negatively charged, so they repel each other. In your experiment, you heated the different milks up. You then added lemon juice, which lowers the pH of the milk because it is acidic, causing the casein complexes to change shape and also altering their charge. As a result, instead of repelling each other, the casein complexes **coagulate**, or clump together. As they coagulate, they capture fat and lactose along the way that get combined into a larger and larger solid, which we see as curds. Think of casein as a bundle of strings that gets tangled, and in the process catches other objects in it.

Production of Curd to finalize it in cheese mozzarella, is experimenting with milk of cow's with unstandardized to 4.10% fat, with milks pasteurized at 72°C / 15 sec. Where we analyzed the physical and chemical properties of all 96 samples of milks and curds from non standardized cow's milk. The process of starting production Curd milk begins to heat at a temperature of 500 l up to 36°C. Then we dismiss at Castaway culture 4gr milk / milk 100l - CHR-Ansen-Firma Type of culter FRC-75 Bacteri Mesophile 70% *Lactobacillus bulgaricus* 50 U (Junit) 5000 l Milk and 30% Bac. *Thermophilus*

*Lactococcus* - *Streptococcus Thermophilus*. Milk had pH = 6.4. After 15 minutes we dismiss 0.6gr Castaway leaven + Ca 40% 1 ml / 10 l milk. Then we made exsiccation of coagulum Grain 15min, to 42 ° C. Cheddarization of curds - to 20-24 ° C, pH = 5.2 - 5.3

This method for producing curds is used with both types of milk from three experiments and three

samples for each experiment, where each sample was analyzed chemical curds physical settings. From cow's milk unstandardized to 4.10% fat and we have gained Curd context the one day and have the following results: pH = 6,10; °SH = 20.29; Fat% = 21.20; Dry matter% = 51,84; General N% = 2,36; General protein% = 24.82; Ash=1,99%; SNF% = 33,13; Fat in SNF = 40,90; Water% = 48,15.

**Table 2. Cow's coagulum**

<b>pH</b>	<b>6.10</b>
<b>°SH</b>	<b>20.29</b>
<b>Fat %</b>	<b>21.20</b>
<b>Materie sec %</b>	<b>51.84</b>
<b>General N %</b>	<b>2.36</b>
<b>General protein %</b>	<b>24.82</b>
<b>Solids ( NaCl) %</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>40.90</b>
<b>Water %</b>	<b>48.15</b>

Statistical analyzes were made to: % of general protein, % of SNF (soli – non –fat), % of Dry matter, % of fat in dry matter, % of water.

The main factor of the economic aspect for the manufacture of curds to produced mozzarella cheese is the standardization of milk with 3.2% fat.

## CONCLUSION

- For the maturity of the curd coagulant the pH must have the value 5.1 – 5.17.
- Flavor of curds is mild, but can differ in taste depending on the process in which it was made. It has about the same firmness and density as cheese, but with a springy or rubbery texture.
- Fresh curds against the teeth when bitten into, a defining characteristic due to air trapped inside the porous material.
- After 12 hours, even under room temperature 20-24 °C can we preserve, cheese curds lose much of their "fresh" characteristic, particularly the cheese mozzarella.
- The curds have a mild flavor and are sometimes somewhat salty, are naturally uncolored. The curds are usually yellow or orange, but it does not require the artificial coloring.
- Quality of the curd totally depends on the starter culture.
- Fermentation also develops the characteristic flavor and color of the product.
- So the results of this particular examination are quite good.

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