

HEALTHY EATING AND BULGARIAN SOUR MILK



Table of contents

1. Abstract

2. Introduction

3. Core contents

3.1. Historical facts and features

3.2. Types and nutritive value

3.3. Organic sour milk vs industrial production of sour milk

3.4. Benefits of organic sour milk / target groups /

4. Put into practice

4.1. Domestic production of sour milk

4.2. Traditional recipes with sour milk

5. Further readings

6. Bibliography

The Unity

Title	Healthy Eating and Bulgarian Sour Milk
Area	Domestic production
Main Target Audience	<p>The end users of the module are ...</p> <ul style="list-style-type: none"> ➤ Students of the participant institutions ➤ Trainers in the partner' institutions ➤ Consumers' associations ➤ Adult training centers ➤ Teachers of primary and secondary education that teach lessons related to environmental awareness and nutrition
Description of the module and general aims	<p>This module allows the participant to understand ...</p> <p>Historical facts and features of sour milk Types and nutritive value of sour milk Difference between organic sour milk and industrial production Benefits of organic sour milk by target groups</p>
Learning Time and Duration	<p>Learning time and maximum duration for the training related to the module:</p> <p>The maximum duration of training is 24 hours, distributed as follows - 8 hours of theoretical training; 8 hours for visits (farms, processors, markets) and 8 hours of practical work.</p>
Learning Objectives	<p>Specific learning goals, i.e. what is going to be trained and will be learnt by the target after a successful completion of this module.</p> <p>Once you have completed this course you will be able to:</p> <p>What is the origin of Bulgarian sou milk; what distinguishes organic from conventional production; how to make domestic sour milk; what benefits there are for health consumption of sour milk; how to use sour milk.</p>
Competences achieved	<p>Specific competences related to the project theme</p> <p>knowledge about values of Bulgarian sour milk; how to make domestic sour milk; how to prepare healthy foods with sour milk.</p>
Pedagogical methods used (selfstudy, group work, distance learning, etc.)	<p>Type of activities considered useful for the training of this module:</p> <ul style="list-style-type: none"> • Theoretical learning /blended learning/: <ul style="list-style-type: none"> - face to face; - online learning. • Practical learning: <ul style="list-style-type: none"> - case study /field survey/; - workshop; - self study.

1. Abstract

This unit is structured into two main sections: (1) Historical facts and features of Bulgarian sour milk and nutritive value and Advantages of bio sour milk and (2) Home made sour milk and Traditional recipes.

In the first section the basic knowledge of Historical facts and features of sour milk are presented. There are several types of Bulgarian sour milk which are suitable for healthy diet. It describes the process of preparation of Bulgarian sour milk and Nutritional and therapeutic properties of Bulgarian sour milk. The second section consists on how to prepare domestic sour milk and the presentation of traditional Bulgarian recipes.

Keywords:

Bulgarian sour milk, nutritive value, therapeutic properties, home made, Traditional Bulgarian recipes.

2. Introduction

Bulgarian sour milk is a fermented milk product, which is obtained as a result of the flow of a lactic acid-fermented milk. Centuries in our land is made sour milk and his fame as a useful and nutritious food gains popularity worldwide. The main micro-organisms that participate in the process of fermentation of the Bulgarian sour milk is 2 - Lactobacillus bulgaricus and Streptococcus thermophilus. They are in a symbiotic relationship and the alliance between the two bacteria is beneficial for their survival and efficacy only when they are together.

Bulgarian sour milk is produced by two ingredients: milk and ferment. Products containing and another ingredient, for example soy, starch, preservatives to stop the fermentation, are not Bulgarian sour milk.

The nutritional value is determined by the content of nutrients and by the ability of these ingredients to be used by the body. Bulgarian sour milk has a higher nutritional value of milk. The reasons are changes under the action of Lactobacillus bulgaricus and Streptococcus thermophilus. The content of lactose in sour milk is reduced by 20-30%. The remaining quantity of lactose is used as an energy source 4.1 kcal. Bulgarian sour milk is a rich source of calcium, which can fully satisfy the needs of man. It contains more calcium than fresh - more than 400 mg in portion.

Bulgarian sour milk is a product that has a very wide use in cooking. It can be consumed directly from the bowl and alone or in combination with various fruits, granola and sweet.

Section I

3. Core contents

3.1. Historical facts and features

Sour milk is a fermented milk product, which is obtained as a result of the flow of a lactic acid in fermented milk. In a large scale it is produced in the Balkan countries and also in other countries around the world because of its good taste, nutritional and medicinal qualities. Two main microorganisms involved in the fermentation of yoghurt - *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. They are in a symbiotic relationship and the alliance between the two bacteria is beneficial to their survival and efficiency only when they are together. It is not possible fermentation in the presence of only one of the bacteria. Each of the two bacteria have a role in the process of fermentation. Fermentation ends naturally by cooling. In several days in warm conditions (kept out of refrigerator) fermentation continues and the taste of sour milk becomes more sour.

There are no accurate data on the origin of sour milk. One theory of its origin is associated with the Thracians. Ancient Thrace possessed fertile soil, rich vegetation and good pasture. All this contributed to develop a flourishing sheep. And because the main pet of the Thracians was the sheep. Thracians noticed that sour milk is kept longer than fresh. By adding the sour milk freshly brewed received product known as curd or “prokish”.

It is assumed that sour milk originated from lactic acid drink called “kumis” that ancient Bulgarian tribes prepared from mare's milk. Once settled in the Balkan region and adopted sheep they began to make “kumis” using sheep's milk. Also Bulgarians started to produce and soure milk under the name “kathak” by using fresh sheep's milk mixtered with cheese. This product Bulgarians generally cooked at the end of the summer, when the milk is at a high dry matter content. Uighur’s tribe which live in Sincan region of North China today called sour milk “kathak”. They prepared it by both mare and sheep's milk.

Genghis Khan (1206-1227) used sour milk for food in the army as a method to preserving meat. Milk was preserved in sheep stomachs. Under the action of the existing micro flora in milk starts process of fermentation and as result the milk turns into sour milk. Once solders scrape it from sheep stomach, they fill the stomachs with milk again, and the rest of sour milk is used for starter of another cycle of milk fermentation.

In Western Europe, yogurt became famous thanks to the French king Francis The First. King suffered from severe and incurable diarrhea. He asked for help its ally, the Ottoman Sultan Suleiman the Magnificent. The Sultan sent a doctor who was able to heal him

with a diet of yogurt. In gratitude the French king spread information across Europe for the food that was able to cure him.

At the beginning of XX century in the most famous for this time scientific institute "Pasteur" in Paris started work the great Russian biologist Ilya Metchnikoff (1845-1916). He made assumption that aging is a disease of man like any other. Metchnikoff assumed that the protein in the large intestine rot, causing yielding toxic amines that are harmful to humans. They are absorbed by the body and cause changes in the tissues of the arterial wall. As a result, nursing changes occur in humans that lead to excessive early death. Metchnikoff believed that the harmful effects of these microorganisms could be reduced by appropriate lactobacilli.

Metchnikoff assume that the large number of centenarians in Bulgaria is a result of regular consumption of sour milk. Metchnikoff gave the first scientific basis for nutritional, dietary and medicinal properties of sour milk and draws the world's attention to it. Convinced of the superior qualities of sour milk as a healthy food Metchnikoff regularly consumed it in the last 10 years of his life.

The first man who examines the microflora of sour milk was Stamen Grigorov (1878-1945), a student of medicine in Geneva. In 1905, he described it as consisting of a rod and a ball lactic acid bacteria. In 1907, rod-shaped bacteria is called *Lactobacillus bulgaricus*. In 1917 Orla Jensen proves that in the process of the production of sour milk except *Lactobacillus bulgaricus* participate cocci (spherical micro) called *Streptococcus thermophilus*.

In foreign literature sour milk is known as "yoghurt". The origin of this word has different interpretations. According to Simeonov (1984), the origin of word is Hun - Altaic and literally means "thick milk" from "yogi" - thick, fat and "urt", "Urdu" or "Urs" - milk.

Ruminant milk (cow, buffalo, sheep and goat) contains large amounts of milk protein called casein. After accumulation of lactic acid casein molecules unfold. In the places where they touch the lactic acid is linked. There the mentioned acid accumulates in an inactive form and does not stop the development of *Lb. bulgaricus*, but it slows down.

When a person consumes Bulgarian sour milk the linked lactic acid released in the stomach and intestines. It suppresses all harmful germs and helps to develop useful. In several hours Lactic acid is vanish. Then lactic acid rods *Lb. bulgaricus*, whose growth has been slowed by the inactive lactic acid, begin to develop. Besides lactic acid they produce many biologically active substances which accumulate and immediately begin to act. *Lb. bulgaricus* continued to be developed in the intestine 10-25 days after the last consumption of Bulgarian sour milk. All this has a number of positive effects on the human body.

The first scientist who described them, is the founder of pharmacology Abu Ali al-Hussain ibn Abdullah ibn Sina (980 - 1037g), also known as "Avicenna". In his work called "Canon of Medicine" he gave the following prescription for the treatment of intestinal disorders "a teaspoon of black cumin (*Nigella sativa* L.) is mixed with a cup of sour milk and drink twice daily for three days". Today pharmacologists know that black cumin oil helps the body to throw rotten intestinal contents and excess gas, and sour milk neutralize accumulated toxins in the intestines and stops the growth of pathogenic microbes.

3.2. Types and nutritive value

3.2.1 Types

According to BDS 12:2010 sour milk is divided by type of raw material and fat of:

- cow, sheep, buffalo, goat and mixture;
- whole and partially skimmed milk.

Composition of milk of some species of animals (average value in %)

Indicators	Type of milk			
	caw	buffalo	sheep	goat
Casein	2,8	3,5	4,8	3,0
Whey protein	0,6	0,8	1,2	0,7
Lactose	4,7	4,7	4,6	4,6
Salts	0,7	0,8	1,0	0,8
Non-fat solids	9,0	9,8	11,6	9,1
Fats	4,0	7,5	7,3	4,0
Solids	13,0	17,3	18,6	13,1
H2O	87,0	82,7	81,4	86,9



3.2.2 Nutritive value

The nutritional value is determined by the content of nutrients and the possibility of these components to be used by the body. Sour milk has a higher nutritional value than milk. This is due to the changes under the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The content of lactose in sour milk is reduced by 20-30%. The remaining quantity of milk sugar is used as an energy source 4,1 kcal. Sour milk is a rich source of calcium for the needs of people. The calcium maintains excitation of the human heart muscle. This element is extremely important for the proper functioning of the nervous system. It stimulates the action of the endocrine glands and accelerates blood clotting. Sour milk is an indispensable source of calcium for people who suffer from lactose intolerance, as well as middle-aged women, who often suffer from bone deformities due to calcium deficiency.

Product	Kcal/100g	Fats, g	Protein, g	Carbohydrates, g
Sour milk 0,5%	37	0,5	3	4
Sour milk 2%	42	2	3	3
Sour milk 3,6%	60	3,6	3,2	2,5
Sour milk 6,5%	90	6,5	3,5	2,5
Sour milk strained	150	11	6	5

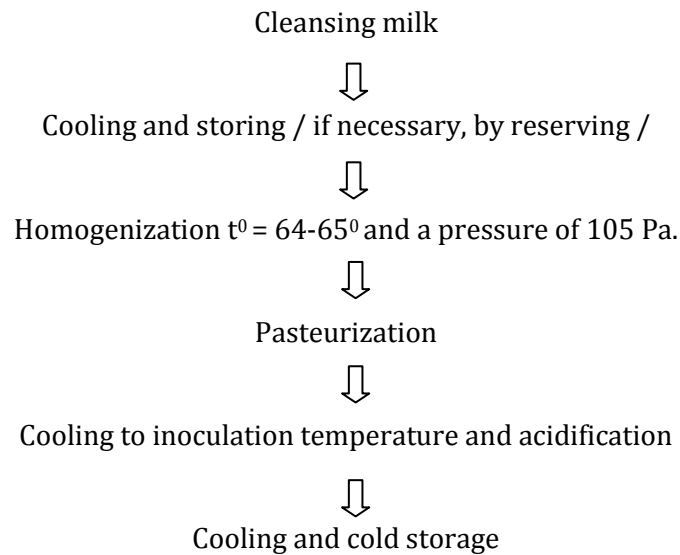
3.3. Organic sour milk vs industrial production of sour milk

3.3.1 Organic sour milk

Bio sour milk is a pure, natural product, with a nice creamy and extremely pleasant lactic acid taste with caramel flavor. Bio sour milk is the only organic milk in Bulgaria. It meets all international requirements and is certified by the "Balkan Biocert" LTD. Milk is produced without antibiotics, growth hormones or dangerous pesticides. It contains no chemicals, milk replacer, preservative or neutralizing agents. This is a pure, natural product, with a nice creamy and extremely pleasant lactic acid taste with caramel flavor.



The technological process for the production of Bulgarian sour milk takes place in the following scheme:



By cleansing milk aims removing physical impurities. The most common way to purify the milk is their percolations through a thin cloth fabric in several layers by periodically remove of the top layer.

It was found that, immediately after milking and 1-2 hours after this, the milk does not constitute a favorable environment for the growth of the microorganisms trapped in it. This feature is of great importance for the newborn mammal, but it has practical significance for increasing the durability of milk as raw material for the production of sour milk. The period of time when the milk is limited to the development of bacteria on the surface thereof is known as a bactericidal, phase of the milk. The length of this period depends on the storage conditions of milk. If immediately after milking, the milk is cooled to a temperature of + 4⁰C bactericidal phase was retained for 24 hours. If milk is cooled down to + 15⁰C bactericidal phase is about 10 hours; at refrigerator temperature + 20⁰C about 6 hours; at + 30⁰C about 2 hours. It should be noted that prolonged cold storage of milk over 48 hours is undesirable because it creates conditions for bacteria that degrade the quality of sour milk.

Homogenization is particularly important when making sour milk from whole milk. Through it prevents the formation of an oily layer on the surface of the sour milk. At a temperature of 64 - 65⁰C and a pressure of 105 Pa milk fat is in the liquid state and the milk is getting homogenized.

In the production of Bulgarian sour milk is applied high thermal Mode + 92 - 95⁰C with retention at this temperature for 30 minutes. With this thermal regime is achieved the following features:

- Disposal of harmful and pathogenic micro flora of raw milk;

- A product with a taste of boiled;
- Yielding a number of decomposition products, which are the growth factors, thermophilic lactic acid bacteria;
- Improvement of the texture of the product;
- Creating favorable conditions for the development of beneficial lactic acid bacteria added as yeast in milk.

The pasteurized milk was cooled to a temperature of 44 - 45°C inoculation, and then add the required amount inoculums (2-5 %). The process of fermentation continues for 2.5 - 3 hours.

After the end of fermentation should be start the cooling of the sour milk to suspend further development of micro flora. Cooling must take place gradually, with the first two hours the temperature was decreased to + 20°C, and in the next two hours, at less than 10°C. Bulgarian sour milk is stored at a temperature of + 1°C to + 4°C. The duration of storage last up to 10 days.

3.3.2 Industrial production of sour milk

Industrial production of sour milk was introduced in other dairies in the country, but the product differs in some degree of homemade. The main disadvantages are reflected in a sharp sour taste of desires, a granular structure. Moreover quickly spoils the desired ratio of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*.

To overcome these drawbacks Professor Tonyu Girginov done extensive research in the Institute of Food Industry - Plovdiv (now University of Food Technologies - Plovdiv) and developing original technology for industrial production of Bulgarian sour milk, built on four basic principles:

- 1) The use of freshly prepared starter culture consisting of active strains of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*;
- 2) Fermentation of milk in two temperature regimes;
- 3) Two-stage cooling of the milk;
- 4) Continuous process of fermentation of milk, combined with the cooling liquid and ripening in a liquid state at 34°C, or without cooling at 22-24°C.

To secure technology with starter cultures in Central Laboratory for pure cultures - Sofia were created seven symbiotic starter that are patented and immediately implement in production.

Sour milk produced by this technology with the original Bulgarian starter has a typical flavor, homogenous structure and dense texture. Technology and starter cultures quickly find application in all dairies in the country and are still used today.

3.4. Advantages of bio sour milk /target groups/

Organic sour milk is unique for the Bulgarian market, which is substantially different from other yogurts on the market. The wonderful taste and flavor are not random. Here are five reasons, which made sour milk as unique product:

- Cows that give milk, eat mostly pasture. Two hundred days a year are pastures and in winter, farmers feed them mainly to meetings in the summer hay and grass mixtures of these same pastures. Often felt in milk flavor of seasonal herbs.

This means valuable balance of Omega 3 and Omega 6 in milk.

- Cows do not fit. Farms that work never tethered cows and they are free to move and decide where around the farm. Every day, even in the snowy winter days, a few hours walking around the mountain.

This means milk from healthy cows.

- Farms are organic. European laws on organic farming certify farms. In these farms care for the health of the soil, clean water and maintaining biodiversity. Cows eat only organic food, fertilizer use, and does not pollute the animals are healthy and the milk, which is given the highest possible quality.

This means pure product with unique taste.

- Not homogenized milk dairy. Almost all milk sold in stores is homogenized - fats are broken down into microscopic particles to obtain a homogeneous mixture smooth. So lose the texture of the cream and milk. Milk is not homogenized, it is believed that this is detrimental to the health process and hampers the body in the absorption of valuable milk constituents.

This means milk that is well accepted by the body.

- Not degreased when not necessary. Most dairies degreased whole milk, then back fat to achieve the desired fat content. A in organic farms that avoids unnecessary processing and proposes milk as milking cows.

This means minimally processed product in the most natural form.

Nutritional and therapeutic properties of Bulgarian sour milk

It was found that 100 grams of sour milk having the same nutritional value as well as 100 grams of milk. But during the fermentation process occurred a number of biochemical changes that give yogurt following advantages:

- It improves digested lactose. About 30% of the lactose is converted to lactic acid by the action of lactic acid bacteria, which facilitate its uptake by people with lactase deficiency;
- It improves absorption of milk proteins. Absorption of milk proteins in sour milk is twice as fast as it contains twice as many free amino acids;
- It improves absorption of lactic acid. There is a significant increase in the content of free fatty acids.

Bulgarian sour milk possesses therapeutic UV, which are as follows:

- It Increased the amount of dissolved calcium, which leads to bone mineralization and is a successful tool to prevail on osteoporosis;
- There is antimicrobial action. Sour milk consumption improves gastrointestinal micro flora;
- Production of compounds with antitumor activity. Bogdanov (1951g.) states that sour milk has antitumor activity in the cell wall and accepts that this is due to the glycopeptide enzyme. Statistical data show that cancer of the stomach, pancreas and liver are not found more frequently in people consuming regular sour milk;
- Stimulates the immune system. Lactic acid bacteria in sour milk produce immunoglobulin that stimulates the body's immunity and increases its resistance against infections;
- Healthy food in diet for reducing cholesterol. Lactic acid bacteria in sour milk show action on the formation of lipid plaques that precede the development of sclerotic processes;
- Preventive action against radiation. Lactic acid bacteria in sour milk increases the body's resistance to moderate doses of ionizing radiation;

Bulgarian yogurt is definitely a valuable food of high biological value, dietary and medicinal qualities.

Section II

4. Put into practice

4.1. Home made sour milk



Bulgarian sour milk is traditional national product. Bulgarian sour milk, as defined in BDS 12-82 as product, which is produced from only two ingredients: milk and yeast. Products containing other ingredients like powder milk, sweeteners, starch are not Bulgarian sour milk.

Yeast is actually sour milk from previous inoculation. It contains two bacteria - *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. If you put yeast in milk and provide the necessary temperature conditions for the development of bacteria after a certain time the milk becomes sour.

Milk becomes sour as follows: boil one liter of milk and allow cooling to about 40-45°C degrees. Pour out the bottle of milk about a quarter to a suitable saucepan and add two to three tablespoons of sour milk. Shake well and pour the rest milk. Stirring the mixture and capped it with a lid. You must not allow the milk to cool over the next three hours. For this purpose, the saucepan is wrapped in a blanket and left in a warm room. After three hours, the blanket should be removed and the sour milk is cooled into the refrigerator. So obtained sour milk may differ from what you buy from the store, because it is natural and has no additives, but it is true Bulgarian sour milk.

If the milk does not curdle the reasons could be the following:

- The temperature was too high, which destroyed the bacteria;
- The temperature was lower and did not provide optimal conditions for the development of bacteria.

4.2. Traditional Bulgarian recipes with sour milk

Tarator



One of the traditional dishes with sour milk undoubtedly is tarator. The most complete recipe for classic Tarator is as follows:

1. a large cucumber
2. half a bunch of dill
3. a pot of yoghurt
4. cold water (one cup of yogurt)
5. two or three cloves of garlic
6. a handful of walnuts
7. two or three tablespoons of vegetable oil / olive oil and salt

Time required preparing:

15 minutes

How to prepare:

1. The first step of the recipe for Tarator is preparing cucumbers. Wash the cucumber and then peel it. If you managed to get a fresh cucumbers produced by a grandmother in the village there is no need to peel them. Cut it in very small pieces /cubes/.
2. Pour the cucumber in a large bowl and add to it finely chopped dill (you can use dried dill), ground walnuts and garlic, which are crushed or cut into very small pieces.
3. Once you have added the garlic, walnuts and dill Salt, add the oil /olive oil/ and mix well. Then beat one cup of milk with one cup of cold water, add to mixture with cucumbers and mix again. Now Tarator is ready.

Airan

Products: cow sour milk 1 kg. /5 cups / water and 1 l /5 cups/ or sheep yoghurt 1 kg. /5 cups/ water and 1,200 liters /6 cups/

Beat milk well and diluted with chilled water, stirring continuously. This beverage is suitable in the hot summer months, as it has a positive impact refreshing people.

QUESTIONS:

Sour milk is a fermented milk product, which is obtained?

- a) as a result of poor hygienic;
- b) as a result of adding artificial to the milk;
- c) as a result of adding sugars to the milk;
- d) as a result of the flow of a lactic acid in fermented milk.

Which type of sour milk is the most nutritive?

- a) From cow milk;
- b) From sheep milk;
- c) From buffalo milk;
- d) From goat milk.

Sour milk has a higher nutritional value than milk.

- a) Yes;
- b) No.

Sour milk is a rich source of...

- a) Calcium;
- b) Potassium;
- c) Magnesium;
- d) Iron.

Write 2 benefits of Bulgarian sour milk.

- 1.....
- 2.....

What is the duration of the process of fermentation?

- a) continues less than 1 hours;
- b) continues for 2.5 - 3 hours;
- c) continues over 1 night.

You can storage organic sour milk...

- a) up to 10 days;
- b) up to 2 weeks;
- c) up to 1 month.

The sour milk must be stored...

- a) at a temperature below 0°C;
- b) at a temperature of + 1°C to + 4°C.
- c) at a temperature over + 10°C.

Which are the main products from Bulgarian sour milk?

- a) Tarator;
- b) Airan;
- c) All are correct.

Are you interested?

5. Further readings

Алипиева, С. Киселото мляко най-полезната храна. АБГ, 2010

Въшин, Ив., Ст. Апостолов. Хигиена на млякото – биологично производство. Биоселена, 2002

Дамяновска, С. Козе мляко. Палмира, 2004

Иванов, Ив. Българското име на дълголетие. София, 2006

Кожев, А. Овче, козе и биволско мляко и продукти от тях. Еньовче, 2010

Кондратенко, М. Българското кисело мляко. София, 2003

Кондратенко, М. Домашно приготвяне на кисели млека. София, 2011

Мермерски, Хр. Българска енциклопедия на народната медицина и здравето. Самиздат, 2007

Михалева, Хр. Маркетингово изследване на удовлетвореността на потребителя от продукта българско кисело мляко. Божич, 2013

Рашева, М. За българското кисело мляко. Мултипонт, 2011

Чомаков, Хр. Българското кисело мляко – здраве и дълголетие. Земиздат, 1987

6. Bibliography

<http://www.supichka.com/>

<http://www.lubopiten.com/>

<http://harmonica.bg/>

<http://bg.wikipedia.org/>