



Production of traditional yogurt from fresh milk from dairy cows in Kosovar families

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ABSTRACT

Kosovo has very favorable natural conditions for developing livestock production, especially milk production from cows.

According to the Kosovo Agency of Statistics, there are 132,971 heads of cattle in the whole country. Of the cattle, the most important role is played by dairy cows, which represent the main specificity of cattle keeping, due to milk production. The total number of dairy cows in the total number of cattle reaches 51.2%,” says the KAS report, where 92% of farms in Kosovo have 1-5 dairy cows, of which 60% are of the “Mixed” breeds and 35% of the “Noble” breeds, as well as 5% of the Autochthonous Bush breed, while 5.8% are commercial farms.

“Based on data and statistics, Kosovo in 2023 has about 5,200 farmers with over five dairy cows.

Kosovo has a utilized agricultural land area of 416,072.33 hectares (including common land). Of the total utilized agricultural land area, the largest part belongs to: meadows and pastures (including common land) with 52.5%; and arable land, where fields participate with 44.9%.

The Government of the Republic of Kosovo subsidizes 80.00€/year per head of cow, while direct subsidies are 50 cents per liter of fresh milk. Kosovo has 43 companies for processing milk into various products according to market demand.

The production of traditional yogurt from fresh milk of dairy cows in Kosovar families has a long tradition and is passed down from generation to generation, especially in the villages of Kosovo, where approximately 50% of the population lives in villages.

Traditional yogurt production at home is one of the foods that is rarely missing in the refrigerators of an Albanian housewife.

Usually, yogurt production is produced by using previous yogurt for coagulation, as well as in rare cases by using yeast. Although yogurt purchased in various stores can greatly facilitate the preparation of various recipes, it cannot be compared to the value of yogurt prepared at home.

Physico-chemical analyses of fresh and raw milk with full fat for the production of yogurt were carried out at the National Agricultural Institute of Kosovo in Peja, with an average fat percentage of 4.3%.

We have continuously followed the entire process of traditional yogurt production in seven Centers of Kosovo with 10 families each. That is, samples were taken from 70 families three times, that is, 270 analyses were made.

KEYWORDS: Family, dairy cow, fresh milk, traditional yogurt, analyses

Introduction

Around the globe, approximately 150 million households are engaged in dairy farming. In most developing countries, fresh milk is produced by smallholder farmers, and dairy production contributes to household livelihoods, food security, and nutrition. Dairy farming provides relatively quick returns for smallholder farmers and is an important source of cash income.

Recently, developing countries have increased their global milk production. This increase is largely a result of an increase in the number of livestock rather than an increase in the productivity of livestock per capita. In many developing countries, milk production is constrained by poor quality feed resources, the prevalence of various diseases, limited access to markets and services such as health, credit, and training, and the low genetic potential of dairy animals for milk production. Unlike developed

countries, many of these developing countries have hot and/or humid climates that are unfavorable for fresh milk production.

In the past three decades, world fresh milk production has increased by more than 59 percent, from 530 million tons in 1988 to 843 million tons in 2018.

The world's largest producer of fresh milk is India, with 22 percent of global production, followed by the United States, China, Pakistan, and Brazil.

Since the 1970s, the largest share of fresh milk production has been in South Asia, which is the main driver of growth in fresh milk production in developing countries.

Fresh milk production in Africa is growing more slowly than in other developing regions, due to poverty and, in some countries, as a result of unfavorable climatic conditions.



The producers of fresh milk with the highest surpluses are New Zealand, the United States of America, Germany, France, Australia, and Ireland.

Meanwhile, the countries with the highest shortages of fresh milk production are China, Italy, the Russian Federation, Mexico, Algeria, and Indonesia. (1,2, 3,15)

History of yogurt production

Yogurt is the most popular fermented milk in the world. Traditional yogurt production has ancient roots that go back thousands of years in Asia, Europe, and the Middle East. The first known appearance of yogurt was during the Neolithic period (around 5000 BC) in Mesopotamia. This makes yogurt more than 7000 years old! It is believed that, like the discovery of butter, yogurt was created by chance when fresh milk was exposed to bacteria or fermented at warm temperatures.

In Turkish texts, yogurt production is mentioned as having been used since the 11th century (1100 BC to 1001 BC) by nomadic Turks.

Neolithic people used pottery and pots to preserve milk, and as a fermented food, yogurt was an excellent way to preserve milk, as the acidity of natural yogurt slows the growth of harmful bacteria.

In Ancient Greece, yogurt was also a popular product, and the Greeks of that time considered 'oxygala', as suitable only for peasants, who consumed yogurt with honey.

Many housewives would make their own yogurt once every two or three days to ensure that this product would never be lacking. Housewives would obtain the yogurt seed from previously prepared yogurt, thus preparing fresh yogurt at home.

Traditionally, the production of natural yogurt in rural areas of the Middle East is gently heated for several hours over low fires using special wood, and the product is known as 'laban mudakhan' or 'smoked yogurt'. The application of heat inactivates the initial culture of organisms and their enzymes present, as well as other contaminants, e.g., undesirable bacteria, yeasts, and molds that may be present. The use of such traditional methods allows the various nomads in that region to extend the shelf life of yogurt for several weeks, or until they reach a market to sell their fresh milk product. Alternatively, the hot yogurt produced is placed in a clean jar and covered with a layer of olive oil or fat, so that the 'smoked yogurt' is preserved during the winter months as long as possible.

In the industries for the processing of natural yogurt, plain, fruit, flavored, or drinking yogurts are subjected to heat treatment after the milk fermentation phase to extend the shelf life of the product. The time-temperature relationships used to achieve this objective depend on: the acidity levels of the milk, the methods of heating and packaging the yogurt, and the storage conditions after production.

"It is true that yogurt has been part of the diet of people for centuries in the Balkan lands. It's a natural process that people somehow discovered... The Balkans are one of the many countries in the world that have the specific bacteria and the right temperature needed to produce yogurt naturally," confirms Elitsa

Stoilova, assistant professor of ethnology at Plovdiv University in Bulgaria.

Wherever yogurt was first invented, what is known is that Bulgaria played a key role in introducing yogurt to the West and turning it into the popular, commercial product we know as yogurt today. It was a Bulgarian scientist who first formulated the chemical composition of yogurt. Shortly after his marriage in 1904, Dr. Stamen Grigorov returned from the Trun region of Bulgaria to study at the Medical University of Geneva. He brought with him a traditional clay pot containing homemade yogurt to analyze as part of his studies. A year later, through his daily experiments, he had identified the essential bacteria that caused fresh milk to ferment and turn into yogurt. The identified micro-organism became known as "lactobacillus bulgaricus" in tribute to the country of yogurt-eaters, forever linking Bulgaria with yogurt production. In honor of his discovery, the village of Trun in Studen Isvor, where Grigorov was born, is now home to the only yogurt museum in the world.

When we talk about yogurt now, we think of Albanian, Turkish, Greek, or even Icelandic yogurt. But in the 1920s and 1930s, as a result of the scientific community's focus on Grigorov's original example, Bulgarian yogurt became fashionable. The scientific work on Grigorov's work on yogurt, detailing its precise composition, was continued by the Russian biologist and Nobel Prize winner Élie Metchnikoff with his experiments in 1904 at the Pasteur Institute in Paris. In his 1908 book "The Prolongation of Life," Metchnikoff established yogurt as a link between the Bulgarian peasants' heavy consumption of it and their longevity. The Rhodope Mountains in Bulgaria are one of the regions with the highest percentage of centenarians in Europe. The idea that yogurt prolongs life sparked a health craze in European countries such as France, Switzerland, Germany, Spain, and Great Britain, causing the once little-known yogurt food to be widely marketed and enter the diet of Western Europeans. (15,16,17)

Work Material for the production of yogurt

The production of traditional yogurt from fresh milk of dairy cows in Kosovar families has a long tradition and is passed down from generation to generation, especially in the villages of Kosovo, where approximately 50% of the population lives in villages.

The production of traditional yogurt in homes is one of the foods that is rarely missing in the refrigerators of an Albanian housewife.

Usually, yogurt is produced by using the previous yogurt for coagulation, as well as in rare cases by using yeast. Although yogurt purchased in various stores can greatly facilitate the preparation of various recipes, it cannot be compared to the value of yogurt prepared at home.

Work methods

We have continuously followed the entire process of traditional yogurt production in seven centers of Kosovo with 10 families each. That is, samples were taken from 70 families three times, that is, 270 analyses were performed.



Table 1: Average results of physical-chemical analyses of fresh milk used for the production of traditional yogurt across seven centers in Kosovo

Milk Samples							
Methods		MF-50 (Moisture analyzer)	Laktoscan			Titrimetri	pH - Mettler Toledo
Nr.	Cods	Dry matter %	Proteins %	Fat %	Lactose %	Aciditetit* (ml 1N KOH/100 ml)	pH
1	Pa numer	13.2	4.0	3.5	4.3	4.0	6.9
2	G1	11.9	3.2	3.5	4.3	6.1	6.9
3	G2	11.4	3.4	3.6	4.4	4.8	7.0

(14)

Traditional Yogurt Production from Fresh Cows' Milk

Traditional yogurt production from fresh cow's milk in the villages of Kosovo is created by bacterial fermentation of milk or the fat content of the milk by adding a starter culture/yogurt (bacteria). Yogurt is most commonly made from cow's milk, but it is also made from the fresh milk of other animals, including goats, sheep, yaks, camels, and water buffalo.

The process of making yogurt through traditional fermentation produces lactic acid, which feeds on the proteins in the milk to create its texture and sweet flavor.

Most families (95%) ferment fresh cow's milk for yogurt production by using previously made yogurt, and only 5% of

them use "yeast" for milk fermentation, whereas a starter culture for yogurt production, the bacteria: *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp *Bulgaricus* are added to fresh milk. It is also common to add additional gut-friendly bacteria, such as bifidobacteria, during the yogurt production process from fresh milk. To produce traditional yogurt from fresh milk, it must be heated to about 85°C to prevent the coagulation of milk proteins. The milk mixture must be cooled to 45°C to add the yogurt cultures/bacteria. A temperature of 45°C must be maintained continuously for 4-12 hours for the fresh milk to ferment successfully.



View of using a pot and pottery to ferment fresh milk into yogurt

If we heat the milk, it makes it possible to obtain a more concentrated amount of dry matter, as the excess liquids evaporate.

When we see steam coming from the surface of the pot, we remove the pot from the heat and let its temperature decrease.

In the airtight glass or porcelain container (since the heat is transmitted to the mass more easily), we pour the yogurt seed, flatten it over the entire surface, and slowly add a little of the milk. Using a wooden spoon, we stir it so that a homogeneous mass is formed.

Then we add the rest of the milk. We stir again and then put the lid on the container. After the hours have passed, we uncover the container, but we must be careful not to shake it too much. We remove the lid leave it for a few minutes, and then place it in the refrigerator so that the yogurt completely sets.

The microorganisms produced lactic acid, which acidified and coagulated the fresh milk, protecting it from harmful microbes.

However, spontaneous fermentations do not always give good results. Fermentation depends on the microorganisms present at the time, and therefore can be very random. This traditional yogurt culture contains lactic acid bacteria and yeast. The texture of the yogurt produced is unique.

The microorganisms present in the yogurt culture vary according to the climate, the milk used, the breed of animal that produced the milk, etc.

Some families use a way to keep it warm: The milk for making yogurt must be fermented between 42°C and 46°C (107-155 F) for up to 24 hours. Then, they cool it and put it in the refrigerator to store it for two or three days and then repeat the same process to start a new yogurt production.

(4,5,6,7,8,9,10,11,12,13)



Table 2: Results of traditional yogurt production

Yogurt Samples							
Methods		MF-50 (Moisture analyzer)	Khejldal	Soxhlet	Titrimetri	Titrimetri	pH - Mettler Toledo
Nr.	Cods	Dry matter %	Proteins %	Fat %	NaCl %	Aciditetit* (ml 1N KOH/100 ml)	pH
1	SH	21.1	2.9	5.8	0.3	2.1	6.2
2	PA	5.5	0.9	4.8	0.2	4.0	5.2
3	G1	14.2	2.1	4.5	0.2	8.1	4.3
4	G2	12.7	3.5	4.3	0.2	7.6	4.5

(14)

Results and Discussion

Without milk quality, we cannot make good yogurt. The average percentage of dry matter in fresh yogurt is 12.7%. The percentage of fat (3.6%), proteins (3.4%), acidity (4.8), and microbiological purity content of fresh milk affects yogurt formation. While fat plays a big role in the taste and consistency of the production of yogurt, proteins also play a crucial role in yogurt making.

The average percentage of dry matter in fresh milk for the production of traditional yogurt was 12.7%. The percentage of fat (4.3%), proteins (3.5%), acidity (7.6), and microbiological purity content of fresh milk affects yogurt formation. While fat plays a big role in the taste and consistency of production of yogurt, proteins also play a crucial role in yogurt making. We have continuously followed the entire process of traditional yogurt production in seven centers of Kosova with 10 families

each. That is, samples were taken from 70 families three times, that is, 270 analyses were performed. Such a traditional yogurt production method, common in many Kosovar families, continues to be used today.

Conclusions

- Without milk quality, we cannot make good yogurt.
- Without the good physicochemical and biological composition of fresh milk, there will be no good quality of yogurt.
- The use of appropriate temperatures for heating and cooling the production of yogurt is undoubtedly one of the main factors for the production of quality yogurt.
- Yogurt is often well tolerated by people with lactose intolerance as the bacteria in yogurt help digest lactose.
- Yogurt is some food rich in calcium; Such a traditional yogurt production method, common in many Kosovar families, continues to be used today.

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