COMPOSITION AND CHARACTERISTICS OF GOAT MILK: A REVIEW

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Abstract: Goat milk is considered one of the valuable dairy product with its nutritional benefits. Goat milk differs from cow or human milk in having better digestibility, alkalinity, buffering capacity, and certain therapeutic values in medicine and human nutrition. The worldwide economic importance of goats' milk is increasing due to high interest of consumers. Potential of goat milk as the substitute for cow milk or the basic of cow milk-free diet is of importance to people with cow milk allergy, to goat milk consumers, producers and the goat milk industry. The functional value of goats' milk may be further exploited through fermentation by selected microorganisms possessing specific features. The nutritional importance of milk in nutrition reinforce the role of its consumption in preventing several chronic conditions like cardiovascular diseases, some forms of cancer, obesity, and diabetes.

Keywords: goat milk, functional product, lactic acid bacteria

Introduction

Goats' has been part of agriculture since almost the first use of domestic animals and presently its popularity is increasing throughout the world.

It is believed that goat was the first animal humans used for the production of milk. The ancient Greeks and Romans drank goat milk, because they believed it was very healthy. Since ancient times goat milk has been used all over the world not only as a food, but also in the treatment of many diseases such as: bronchitis, allergies, by providing better immunity, treating and strengthening of the lungs. Vitamins of the goat milk are beneficial for the nervous system, it has higher concentration of calcium, being important in building strong bones and keeping normal blood pressure [1].

The use of goat milk in developing countries as an excellent food source is undeniable. Goat milk is considered one of the healthiest food, its chemical composition being similar to human milk and has specific taste and smell, thus being unacceptable for the consumers.

Some research suggests that one of the main benefits of goat milk is that it may be benefit in case of inflammation. Another reason why it is better for people with bowel inflammation to drink goat's milk instead of cow's milk [2].

Goat milk and its processed products are greatly useful as a functional foods, maintaining nourishment and health for young and elderly, especially those who have cow milk allergy. The regular consumption of goat milk by individuals with iron deficiency anemia improves their recovery, since it enhances the nutritional use of iron and enhances the regeneration of hemoglobin [3].

The purpose of this paper was to review the potential of goat milk products in human nutrition and it economic significance.

Composition of goats' milk

Milk and dairy products are included as important elements in a healthy and balanced nutrition because represent the great sources of protein and calcium, also contain many nutrients and provide a quick and easy way of supplying these nutrients to the diet within relatively few calories.

From the nutritional point of view goat milk is a valuable dairy product. Goats' milk has some particular properties that confer technological advantages in comparison to cow's milk.

The proteins from goat milk are more digestible than those of cow milk and the absorption of amino acids is more efficient. Goat milk protein content is 3,5% to 4,5%.

Goat milk has less lactose ranging from 4,3% to 4,8% compared to cow milk, giving it advantage among the lactose intolerant human population. That's why goat milk has been recommended as a substitute for those who suffer from allergies to cow milk or other food sources [4].

A much overlooked component in goat milk is its fat or lipid content. Average goat milk fat differs in contents of its fatty acids significantly from average cow milk fat being much higher in butyric, caproic, caprylic, capric, lauric, myristic, palmitic, linoleic, but lower in stearic and oleic acid.

Mineral contents of goat milk showed higher level of Ca, P, K, Mg, and Cl.

Average amino acid composition of goat and cow milk, shows higher levels of essential amino acids: threonine, isoleucine, lysine, cystine, tyrosine, valine.

Goat milk differs from cow milk in higher digestibility, distinct alkalinity, higher buffering capacity, certain therapeutic values in medicine and human nutrition [4, 5].

The composition of basic nutrients in goat, sheep, cow, and human milk are given in Table 1, but vary with diet, breed, individuals, parity, season, feeding, environmental conditions, locality, stage of lactation, and health status of the udder [6].

Table 1. Average composition of basic nutrients in goat, sheep, cow, and human milk

Composition	Goat	Sheep	Cow	Human
Fat (%)	3.8	7.9	3.6	4.0
Lactose (%)	4.1	4.9	4.7	6.0
Protein (%)	3.4	6.2	3.2	1.2
Casein (%)	2.4	4.2	2.6	0.4
Solids-non-fat (%)	8.9	12.0	9.0	8.9
Calcium (mg/100 g)	72	105	69	68
Phosphorus (mg/100 g)	134	193	122	33

The importance of goats' milk and products

In recent times goat farming is gaining in importance in the world. Factors that the effective in this the production of goats' milk and its processing constitutes an economic activity of increasing importance due to high nutritional interest of goats' milk, as it provides high quality protein, fat, carbohydrates, vitamins, and several minerals, such as iron, calcium, and phosphorus [4, 7].

The production of cheese from goats'milk has a very long history and is an important source of protein for people in several countries [8, 9, 10]. In the last decade,

there has been an increased interest for goat milk production and its conversion to value added products as well as a renewed interest in goat milk as an alternative milk source for people with cow milk intolerance [5]. In some developing countries, goat milk provides a principal source of animal protein, calcium and phosphorus to human nutrition [11, 12].

Goat milk has played a very important role in health and nutrition of young and elderly. Goat milk has also been known for its beneficial and therapeutic effects on the people who have cow milk allergy. These nutritional, health and therapeutic benefits enlighten the potentials and values of goat milk and its specialty products. The chemical characteristics of goat milk can be used to manufacture a wide variety of products, including fluid beverage products, fermented products such as cheese, buttermilk or yogurt, frozen products such as ice cream or frozen yogurt, butter, condensed/dried products, sweets and candies.

High quality products can only be produced from good quality goat milk. The quality milk should have the potential to tolerate technological treatment and be transformed into a product that satisfies the expectations of consumers, in terms of nutritional, hygienic and sensory attributes. goat milk is also generally contain less pesticide and composition of microorganisms and also increases the importance of being close to mother's milk. [6, 13].

The potential of goats' milk as a functional product

Goat milk is produced for human health and nutrition of dairy products in terms of features, the less valuable it is clear that the positive. The production of quality goat's milk products can be rewarding, profitable, pleasant and successful. Although it has played an important role in human nutrition. So, recently has been increasing demand to functional foods. Functional foods can be defined as foods that have positiv effects on the health and important development in this regard has been in goat's milk products [20].

Potential of goat milk as the substitute for cow milk or the basic of cow milk-free diet is of importance not only to people with cow milk allergy, but to goat milk consumers, producers and the goat milk industry too. Goats'milk nutritional properties and lower allergenicity in comparison to cow milk, especially in nonsensitised children [4, 5, 8, 9, 10, 14, 15], has led to an increased interest in goat milk as a functional food, and it now forms a part of the current trend to healthy eating in developed countries [11, 15, 16]. Thus, the use of milk with particular nutritional properties alone or in combination with bacterial strains having probiotic properties and producing physiologically active metabolites, represents one of the technology options for manufacturing new dairy functional products [17, 18].

Milk and its processed product represent one of the growth media for lactic acid bacteria. Interest in microorganisms as a component of biological diversity has been renewed in recent years. The interest in microorganisms occurring in foods is primarily due to the biotechnological potential of new bacterial species and strains.

The functional value of goats' milk may be further exploited through fermentation by selected microorganisms possessing specific features. A mixed starter comprising *Lactobacillus acidophilus*, *Lactobacillus bulgaricus* and *Streptococcus thermophilus* has been successfully used for fermentation of goats' milk and a high

viability of probiotic strains in a fermented goats' milk.

New sources of nutrients should be more exploited for varying the human diet and also to benefit from new functional ingredients and natural food components. The beneficial microbiota of goat milk represented by lactic acid bacteria is a potential source of biological materials to be used in dairy technology. The transformation of goat milk by fermentation is not easy and more research for elucidating the process is needed [19].

Nowadays in Moldova goat's production exists on local level and normative documentation for goat's milk production doesn't exist also as scientific researches of the selection of lactic acid bacteria from goat raw milk from different regions of Moldova with valuable characteristics for dairy industry. Thus, the study of biochemical, physiological and phenotypic properties of lactic acid bacteria strains isolated from the raw goat milk produced in different regions of Moldova took place in laboratory of Food Biotechnologies, ISPHTA, Chisinau. Goats milk is suitable as cow's milk for culture growth while the biochemical activity of culture starter is greater in goats milk than cow's milk. The use of goat milk in combination with bacterial strains having probiotic properties and producing physiologically active metabolites, represents one of the technology options for manufacturing new dairy functional products. It has beneficial effects for health maintenance, physiological functions, in the nutrition of children and elderly people [5, 12], and can be consumed without negative effects.

The economic significance of goats' milk

Goat production constitutes an important part of the national economy in many countries. Such activity has particular importance in France, Italy, Spain and Greece. So, goat's dairy products possessed the same importance and formed a part of meals in developed countries according to their health benefits and functional properties [7, 21].

In developed countries, after 100 years of lower production, the position of goat farming has turned positive again. During the last 20 years, the number of goats around the world has increased by about 60%, not only in the countries with low incomes (75%) but also in those with high (20%) and intermediate (25%) incomes [22, 23, 24]. China has the largest goatherd with 195.6 million, followed by India with 120.0 million, and Pakistan 56.7 million. China, India, Pakistan, Indonesia and Bangladesh together contribute 78% of the total small ruminant population in Asia [12, 25]. In Pakistan, the Damani and Kamori breeds are popular, while in other countries popular breeds are Barbari, Beetal, Jamnapari, Malabar, Damascus, Barky and Black Bengal [12]. Since 1990, there has been a significant increase (47%) in goat numbers all over the world [26].

Goat milk production is of significant importance to the economy and survival of large populations of many countries in the world: in developing countries (i.e. Asia, Africa, the Middle East and Mediterranean countries and South America) as well as in developed countries (i.e. Europe, North America and Oceania). This production increased by around 70% between 1991 and 2011 (FAOSTAT, 2013). One of the most decisive factors in the growth in the consumption of goat milk and derived products is their perceived beneficial effects on human health, which are fully recognized by the scientific community. Goat milk has an acceptable, attractive taste, and can be consumed as an alternative to cow milk because it is non allergic and higher

digestibility [27].

Many traditional dairy products that are accepted by the consumers worldwide are made from sheep or goat milk or from their mixtures.

Milk production create income for economy and employment of a country. In Republic of Moldova dynamic of milk production has increased because of the increasing number of goats. Today the goat's population has increased by about 180.000 and is increasing every day.

The Moldavian dairy industry is an important part of the agricultural sector. But goat's dairy products are produced in small individual farmers which has the economic importance too.

Milk production of goats is likely to be much greater , because of the large amounts of unreported home consumption. For our country it is good economic and ecological factor and possibility to make dairy production more profitable.

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