

Nutritional and Medicinal Attributes of Goat Milk

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ABSTRACT

Air, food, and water are essential for the continued existence of life. Among various types of foods available, milk is a unique gift to the mankind. Milk is an important source of many nutrients, such as protein, carbohydrate, fat, minerals, and vitamins that are required to maintain good health. Presently, India is the largest producer of milk in the world. Milk is produced from the mammary glands of healthy herbivorous animals like cows, buffaloes, goats, sheep, camel, yak etc. Goat contributes about 2.1 % of global milk production. In many countries of the world, milk and dairy products provide about 5 to 10 % of the total calories of daily human diet. Consumption of raw milk may pose microbial hazards to the health of consumers. Public must be educated that proper pasteurization of milk is imperative from safety point of view. There is a need of a holistic approach to produce clean and wholesome milk that is safe to human health.

Key words: Food safety, Goat, Health, Human, Microbes, Milk, Pasteurization

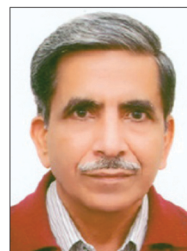
INTRODUCTION

Goat (*Capra hircus*) is a domesticated ruminant, which has been utilized by humans for milk, meat, hair, and skin (Pal, 2014). Goats are reared in all regions of the world. The majority of the world goat population is found in the Asia and Mideast. In the recent past, rearing of goats for milk has become a widespread economic activity that attracts many farmers in this venture to support their livelihood. Several nations in the world

like Australia, Ghana, India, Israel, Kenya, Malaysia, Philippine, West Indies etc. are now engaged in goat farming for commercial milk production. The rearing of goat is cheaper compared to cows, and hence they are mostly raised by the low-income or middle-income groups. In India, goat is commonly called as poor man's cow. Total goat population in the world is estimated 861.9 million. According to the National Livestock Census 2007, goat population in Rajasthan State of India is 21.5 million, which contribute to about 14 per cent of India's total goat population (Pal, 2014).

Goat farming is now recognized as a profitable agribusiness and thereby, attracts many farmers to this project. There are more than 210 breeds of goats in the world. Saanen is the largest of the dairy breeds and can produce up to 3 gallons milk per day with an average of 1.5 gallons daily. Several breeds of goat, such as Barbari, Beetal, Jamnapari, Jakhrana, Jamnapari, Osmanabadi, Sirohi, and Surti are present in India. Among these, Surti goats are among the best dairy goat breeds in India. The daily production of milk from Surti goat is about 2.25 kg. Dairy goats usually produce between 660 and 1,800 litres of milk during lactation period. On average, a good quality dairy goat will yield at least 2.7 litres daily (Pal, 2014).

Presently, India is the leader in the production of goat milk in the world, followed by Bangladesh, Sudan, Pakistan, Mali, France, Spain, Turkey, Somalia, and Greece. In India, over 5 million metric tons of goat milk is produced each year. In the regions of Africa and South Asia, goat milk is generally consumed raw or acidified. However, in Latin American and Mediterranean countries, goat milk is normally converted into cheese. Goat milk is widely consumed by the people of all religions, races, and communities. The importance of goat milk has augmented globally due to its high medicinal value for human health (Pal, 2014). Goat milk is considered better to cow milk and more parallel to human milk. It is recommended to infants, old and convalescent people. Goat milk has several



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advantages over cow milk, for example, lower allergenicity, higher digestibility, smaller size of fat globules, and higher proportion of short chain fatty acids (Pal, 2014). The present communication briefly describes the nutritional and therapeutic values of goat milk.

NUTRITIONAL PROFILE

Goat milk is consumed globally by both sex, all age groups, in all seasons, in rural and urban area and in all climatic zones. The pH value of fresh goat milk ranges from 6.5 to 6.8. The specific gravity of goat milk should not be less than 1.028 at 20°C, and freezing point should not be above -0.53°C. The chemical composition of goat milk and other mammals is shown in Table 1. Goat milk contains 87-88 % water; 4.0- 4.5 % fat, 2.9-3.7% protein, 3.6- 4.2% lactose, and ash 0.8-0.9 %. It has less lactose, but contains more calcium, potassium, vitamin A and vitamin B6 than cow's milk. Goat milk has higher levels of essential amino acids, such as cystine, leucine, lysine, phenylalanine, threonine, tyrosine, and valine compared to cow's milk. Goat milk is highly nutritious as contains protein of high biological value, essential fatty acids, minerals, and vitamins (Haenlien, 2004). It has high concentration of calcium, chloride, copper, phosphorus, potassium, selenium, and zinc than cow milk. Goat milk possesses more quantity of oligosaccharides (non-digestible carbohydrates) than cows' milk (Kiskini and Difilippo, 2013). These may act as prebiotics in the gut and can help to maintain the health of the digestive tract. A number of factors, such as breed, age, nutrition, management, season, health status, environment, and stage of lactation may be attributed to the variation in the composition of milk (Pal, 2014).

DAIRY PRODUCTS

In India, about 50% of the milk is converted to prepare a variety of traditional dairy products (Pal, 2019). A wide variety of dairy products, such as cheese, butter, cream, butter oil,

Table -1: Chemical composition of milk of various mammals

Mammal	Water (%)	Lactose (%)	Fat (%)	Protein (%)	Ash (%)
Goat	87 - 88	3.6 - 4.2	4.0 - 4.5	2.9 - 3.7	0.8 - 0.9
Buffalo	82 - 84	4.5 - 5.0	6.0 - 10.5	3.3 - 3.6	0.8 - 0.9
Cow	85 - 87	4.8 - 4.9	3.7 - 4.4	3.2 - 3.8	0.7 - 0.8
Camel	86 - 88	3.3 - 4.4	2.9 - 5.4	3.0 - 3.9	0.6 - 0.9
Sheep	79 - 82	4.3 - 4.8	6.9 - 8.6	5.6 - 6.7	0.9 - 1.0
Yak	83 - 85	4.5 - 5.0	5.5 - 7.5	4.0 - 5.9	0.8 - 0.9
Human	88 - 89	6.8 - 7.0	3.3 - 4.7	1.1 - 1.3	0.2 - 0.3

ice cream, condensed milk, dry whole milk, flavored milk, yoghurt, Kefir, Gjetost, Kishk, Cajeta, paneer, ghee, channa, srikhand, chakka, rasgulla etc. are manufactured from the milk of goat (Yangilar,2013; Pal,2014; Pal *et al.*,2017).

MICROBIAL CONTAMINATION

Milk and dairy products are rich in several nutrients, and therefore, easily get contaminated by microbes, which are wide spread in our environment. Contamination can occur from dirty utensils, unsanitary buildings, soiled hand of workers, and poor quality packaging materials (Pal, 2019). A number of bacteria (*Acinetobacter* spp., *Alkaligenes* spp., *Bacillus* spp., *Enterobacter* spp., *Microbacterium* spp., *Micrococcus* spp., *Pseudomonas* spp., *Serratia* spp., etc.) as well as fungi (*Aspergillus* spp., *Alternaria* spp., *Cladosporium* spp., *Fusarium* spp., *Mucor* spp., *Penicillium* spp., *Rhizopus* spp., etc.) result in the spoilage of milk and dairy products. The bacteria can be isolated from milk and milk products on various nutrient media like blood agar, nutrient agar, MaConkey's agar, and fungi on Sabouraud dextrose agar, yeast extract agar, Pal sunflower seed medium etc (Pal, 2014). In addition, pathogenic bacteria such as *Bacillus cereus*, *Campylobacter jejuni*, *Escherichia coli*, *Listeria monocytogenes*, *Salmonella* spp., and *Staphylococcus aureus* have been isolated from fresh raw goat milk. The consumption of such contaminated raw milk has been implicated in food infection and food poisoning (Pal, 2014). It is pertinent to mention that to good hygienic practices must be adopted during milking to reduce the chance of contamination by microbes (Pal, 2014).

MEDICINAL VALUES

Goat milk serves as a medicinal food for persons suffering with milk allergies, and

other problems such as migraine, insomnia, asthma, eczema, neurotic indigestion, acidity, stomach ulcer, colitis, constipation, gastric ulcer, anxiety, anemia, osteoarthritis, gall bladder stones and liver disorders (Yangilar,2013; Pal, 2014; Pal *et al.*,2017). It also improves the skin, hair, and brain health. Fermented goat milk may reduce the risk of cardiovascular disease (Vaquil and Rathee, 2017). In India, many people believe that goat milk is helpful in curing dengue fever; a viral disease transmitted through the bite of mosquitoes. However, ample scientific data is lacking to support this finding. Therefore, comprehensive studies should be undertaken to critically assess the effect of goat milk in the treatment of dengue fever; a life threatening vector borne disease of major public health importance in India and other countries.

ADULTERATION

Adulteration of food is highly rampant in many developing nations of the world. It is a malpractice that is deliberately done by the producer to get more profit. It is documented that about 57 % of people in the world have developed health problems due to consumption of adulterated and contaminated foods (Pal, 2017). A large number of adulterants like caustic soda, urea, detergents, coal tar dyes, paints, formalin, hydrogen peroxide etc are added in milk; and ingestion of such adulterated milk will cause health hazards to the consumers (Pal, 2017). Very recently, Pal (2017) has emphasized that milk adulteration is a growing public health concern (Pal, 2017). As goat milk is receiving global attention, hence, it is advised to detect adulteration of goat milk with other dairy animal's milk by employing various techniques.

CONCLUSION

Milk is a rich source of several essential

nutrients including protein, calcium for the maintenance of health. It is emphasized that potential of goat milk for producing value added products should be further investigated. There is a need to educate the producers, retailers, and consumers about the importance of hygienic handling of milk to protect from microbial contamination to safe guard the health of the people. Considering the nutritional and medicinal values of goat milk, there is a need to modernize the goat dairy sector to produce high quality of milk products with long shelf life.

DEDICATION

We dedicate this paper in memory of Late Ms. Preeti Paul who was pursuing Ph.D. in Dairy Technology program under the guidance of Dr. Suneeta V. Pinto, at SMC college of Dairy Science, AAU, Anand, Gujarat, India. She was a recipient of gold medal during her B. Tech. (Dairy Technology) degree studies, and was adjudged "**Overall Best Student**" of Bachelor of Technology program (2008-2012).

REFERENCES

- Haenli, G.F.W.(2004): Goat milk in human nutrition. *Small Ruminant Research* 51: 155-163.
- Kiskini, A and Difilippo, E (2013): Oligosaccharides in goat milk: structure, health effects and isolation. *Cell Molecular Biology* 59: 25-30.
- Pal, M. (2014): Goat milk and its potential in dairy industry. MSc Lecture Notes. Addis Ababa University, College of Veterinary Medicine, Debre Zeit, Ethiopia. Pp.1-11.
- Pal, M. (2017): Milk adulteration a growing public health issue. *Food and Beverage Processing* 4: 30-31.
- Pal, M. (2019): Paneer: A very popular milk product in Indian subcontinent. *Beverage and Food World* 46: 23- 25.
- Pal, M., Dudhrejiya, T. P and Pintoo, S. (2017). Goat milk products and their significance. *Beverage and Food World* 44: 21- 25.
- Yangilar, F. 2013: As a potentially functional food: goat's milk and products. *Journal of Food and Nutrition Research* 1: 68-81.
- Vaquil and Rathee, R. (2017): A review on health promoting aspects of goat milk. *The Pharma Innovative Journal* 6: 5-8.
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