

Health Benefits of Goat Milk

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Introduction

Goat (*Capra hircus*) is the oldest domesticated animal. In ancient times goat milk was valued the most and it still plays an important role in human nutrition. Goat is one of the main contributors of milk and meat products. Goat milk is different from cow and human milk in composition, nutritional and therapeutic attributes. Goat milk and other goat derived products contain several bioactive compounds that might be useful in patients suffering from a variety of chronic diseases. The difference in the composition of cow milk and goat milk may result into the product with different sensory characteristics. The popularity of goat milk is increasing throughout the world because of rise in number of small herds as a source of income and it plays an important component of livestock industries & vital role in social economic structure of rural poor the worldwide increase in the consumption of goat milk and its related products is due to its organoleptic and great nutritional properties. the increasing milk demand can be overcome by increasing ruminants such as goats. Goat also called as “poor man’s cow” and is an important source of milk.



We cannot deny the fact that Goat can easily adapt to harsh climates making them an important component in the livestock industry more so to the poor units and marginal farmers.

Composition

Milk and derived dairy products are an important constituent of a balanced diet. Milk, as a first food for mammals supplies all the energy and nutrients needed for proper growth and development. Goat milk differs from cow and human milk in having better digestibility, alkalinity, buffering capacities and certain therapeutic values. The basic nutrient composition of goat milk resembles that of cow milk.

Basic composition of various milks (mean values per100 g)

Gross	Goat	Cow
Composition		
Total solids (g)	12.2	12.3
Fat %	4.0-4.5	3.8
Protein %	3.2	3.3
Lactose %	4.6	4.7
Ash (g)	0.8	0.7
Water %	87.5	87.7
Energy (Kcal)	70	69
Minerals (mg/100g)		
Na	34.0	50.0
K	180.0	150.0
Ca	129.0	120.0
Mg	20.0	12.0
P	106.0	95.0
Fe	0.04-0.1	0.05
Cl	130.00	95.0
Vitamins(per 100g)		
Vitamin A(IU)	185.0	126.0
Thiamin (mg)	0.05	0.04

Riboflavin(mg)	0.14	0.16
Niacin(mg)	0.28	0.08
Vitamin B(mg)	0.05	0.04
Folic acid (mg/ L)	6.0	50.0
Vitamin B12 (mg)	0.05	0.14
Biotin (mg)	2.00	2.00
Vitamin C (mg)	1.50	1.50
Vitamin D (mg)	0.06	0.03

Goat milk has some particular properties that confer technological advantages in comparison to cow's milk such as smaller size of fat globules which provides smoother texture in derived products, lower amount of alpha- casein resulting in softer gel products, a higher water holding capacity and lower viscosity. However, flavor of goats' milk is more intense in comparison to cow's milk. This can restrict the acceptance of derived products by consumers. Goat milk is an excellent alternative to cow's milk. The composition of cow milk vary depending on the animals breed, diet, environment and point in lactation period. Like cow milk, goat milk contains four types of casein i.e. alpha-s1, alpha s2 , beta and kappa casein but in different proportion. the major component of goat milk is beta casein and level of alpha s2 casein is relatively high in goat milk whereas alpha s1 is the major components of cow milk casein. But alpha s1 and alpha s2 casein together are lower than alpha s1 fraction alone in cow milk such differences might contribute to soft curd forming properties, better digestibility and least allergic to children.

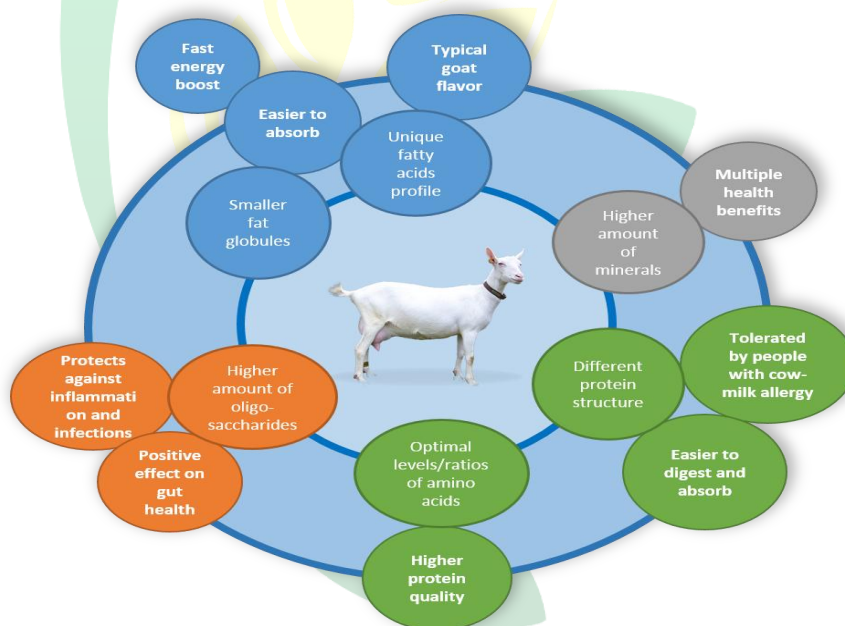
🐐 Comparison of proteins of goat and cow milk

Protein	Concentration %	
	Goat milk	Cow Milk
Total casein	2.33-4.63	2.4-2.8
Alpha s1 casein	0-28	50.0-53.6
Alpha s2 casein	10.0-25.0	12.5-14.3
Beta casein	06-64.0	37.5-39.3
Kappa casein	15.0-29.0	8.3-14.3
Beta lactoglobulin	39.2-72.1	40.0-57.1

Immunoglobulins	4.6-21.4	10.0-25.7
Alpha lactalbumin	17.8-33.3	12.0-24.3
lactoferrin	5.1-21.5	4.0-5.71
Whey protein	0.37-0.70	0.5-0.7

Although having differences in casein protein of goat milk from cow milk, it is relatively easily digestible and accepted by human digestive system. The smaller size of fat globules provides a better dispersion and a more homogenous mixture of fat. Increased total surface area of the globules makes it easier for enzymes to reach and get in contact with the lipids.

Goat milk is an adequate source of Vitamin A, Thiamine, Riboflavin, and Niacin compared to cow milk. Goat milk has lower amount of vitamin E, folic acid and vitamin B12 which can result in “goat milk anemia” if additional sources for these vitamins are absent in the diets.



Goat milk has higher bioavailability, due to the presence of higher amounts of nucleotides that in turn increase absorption in the intestine. The main characteristics of the goat milk is high content of short and medium chain fatty acid. Average goat milk fat profile of fatty acid has higher levels of butyric, caproic, caprylic, capric, lauric, myristic, palmitic and linoleic acids as compared to cow milk. In conclusion, nutritionally, goat milk is

comparable to cow milk as it contains similar levels of calcium, potassium, phosphorus and many other nutrients that confer health benefits. It is also rich in mono unsaturated and polyunsaturated fatty acids & medium chain triglycerides while containing less lactose than cow's milk. Above all these properties, the bioavailability and digestibility coefficient make it particularly helpful in attenuating irritable bowel type symptoms.

Benefits of goat milk

Implications on health and diseases

- **Alleviation of lactose intolerance:-** Although, both cow milk and goat milk contain lactose. despite that fact, many people with lactose tolerance do tolerate to drink goat milk. It is due to high digestible coefficient and better bioavailability that leads to better absorption in intestine. Goat milk is more completely and easily absorbed leaving less undigested residue behind in the colon to ferment and cause the uncomfortable symptoms of lactose intolerance.
- **Prevention of milk allergy: -** Cow's milk allergy is common disease of infancy and childhood. It is an IgE mediated allergy, meaning that body produces IgE antibodies against certain proteins i.e. allergens, in cow milk. Repeated ingestion of milk triggers the immune response by identification of these antigens. causing certain symptoms like eczema, respiratory symptoms(wheezing and asthma), gastrointestinal symptoms or even anaphylaxis. The protein alpha s2 casein and beta lactoglobulin are important allergens in cow milk allergy. The allergy causing properties of beta lactoglobulins can be partially eliminated by certain treatments as extended heating. But caseins maintain the capability of binding to IgE's even after a strong eliminating process. Since the content of alpha s1 casein is very high in cow milk but relatively low in goat milk so it is suggested as an alternative milk source for cow milk allergies. Hence, goat milk is considered as the better substitute in this aspect.
- **Immunomodulatory effect: -** Since goat milk us alone cannot be used a as substitute for cow's milk but we cannot deny the fact that goat milk has been found as an important tool to prevent cardiovascular diseases . the recent studies showed that the effect of goat milk on human blood cells in terms of cytokine release & nitric oxide . They demonstrated that goat milk can trigger cytokine production (IL-10, TNF-alpha & IL-6) as well as active Nitric oxide release from blood cells. And we all know that

nitric oxide release can be helpful in the prevention of cardiovascular disease being a strong vasodilator & an effective antimicrobial agent. Further NO possesses other antiatherogenic activities such as inhibition of platelet aggregation, inhibition of adhesion of smooth muscle cells to the vascular wall, etc. Goat milk can be helpful in maintaining inflammatory homeostasis by stimulating production of multiple cytokines.

Conclusion & future prospects

So, after discussing all the unique characteristics of goat milk. We have come to the conclusion that although having high nutritional value & many health benefits, it can be recognized as a best substitute for cow milk. The average composition of goat milk does not differ remarkably from cow milk but the superior digestibility, bioavailability, the proper composition of fatty acids & its content of bioactive compounds seems to give properties suitable for treating or preventing certain medical conditions. Goat milk might have beneficial effects on malabsorption disorder and inflammatory bowel diseases. It has the property to reduce cardiovascular disease by anti-oxidant & anti-atherogenic effects. Besides many beneficial effects of goat milk, the advantage of breeding goats are; lower cost of animals, need for less feed and water & often not requiring the specialized housing that livestock need are the reasons to promote the improvement of goat milk production in India. Studies are required to reduce the goaty flavor of goat milk either by genetic or chemical modification which makes it less acceptable otherwise goat milk is shown to be the unique whether in its nutritional properties or its therapeutic use. Hence, we can say – “Goat Milk Is Actually Greatest Of All Times (G.O.A.T)”.