

## Goat Milk: A Boon for Human Health

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### Abstract

Goat milk from different European breeds is less fattened in the tropics than it is in temperate regions. Compared to other breeds, dwarf goat milk contains more fat, protein, and lactose. The five primary proteins in goat milk,  $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin,  $\kappa$ -casein,  $\beta$ -casein, and  $\alpha$  2-casein, have homolog's that resemble cow equivalents quite a little. Goat milk lacks bovine  $\beta$ s1-casein, the protein most commonly present in cow's milk. Compared to bovine micelles, goat milk caseinate micelles lose  $\beta$ -casein more quickly and are less solvated and heat stable. They also contain increased inorganic phosphorus and calcium. Goat milk contains less orotic acid and N-acetyl neuraminic acid, folate, vitamin B6, and vitamin B12 than cow milk. It also has higher potassium and chloride levels. Three fatty acids capric, caprylic, and caproic have potent therapeutic effects that can help patients with a variety of ailments. Goat milk is good for preventing allergies, cancer, heart disease, and microbes. As the best source of nutrients in a well-balanced ratio, milk also helps the body through a variety of beneficial biological functions that enhance the digestive system, metabolic processes related to ingested nutrients, organ development, growth, and resistance to illness. Higher concentrations of selenium found in goat milk help regenerate blood platelets in patients with dengue illness. Goats are regarded as the poor man's animal and are thought to be the earliest domesticated animals. They were raised for their meat and milk. The closest thing in nature to the ideal diet is goat milk. It was once used to strengthen immunity. Fermented goat milk products containing live probiotic cells have a promising future in terms of their nutritional and therapeutic properties. Due to the presence of tiny lipid globules, goat milk is recognized for having superior digestion when compared to cow milk. Goat milk's ability to prevent cancer is attributed to its poly-unsaturated fatty acids (PUFA).

**Keyword:** Nutritional value; Medicinal characteristics; Therapeutic properties; Goat milk and PUFA.

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## INTRODUCTION

According to Park and Heinlein (2006), goats are an essential part of the livestock sector and the socioeconomic structure of the rural poor. This type of business usually sells its goat's milk as whole or processed into cheese, dry milk products, or evaporated milk. The parameters influencing the nutritional value and composition of caprine

milk are important to know because of the growing interest in this product. It is also beneficial to compare the milk from goats and cows and make any notes about advantages or drawbacks that may arise from the variations that are discovered. Human milk's composition places it within the biological range of what babies should eat. A significant portion of its chemical makeup protects against food poisoning, inflammation, and infection while also supplying nutrients, facilitating digestion, and supporting the growth of organs. Nonetheless, time restraints, medical issues, and urbanization could lead to an early end to breastfeeding. During the COVID-19 epidemic, even the Indian government's national guidelines advised against breastfeeding because it is extremely risky and may not be feasible if a person is isolated (Chawla *et al.* 2020). Goat milk has additional benefits for cancer patients. Goat milk contains oligosaccharides that function as prebiotics and have immunomodulatory qualities that shield the body from dangerous and lethal germs (Peng *et al.* 2020).

### COMPOSITION OF MILK

The different compositions of goat, cow, and human milks are listed in Table 1 (Park *et al.*, 2007). These compositions vary depending on factors such as diet, breed, individuals, parity, season, feeding, management, environmental conditions, locality, lactation stage, and udder health (Park *et al.*, 2007; Park, 2006). Since milk is a mammal's first food, it supplies nearly all of the energy and nutrition needed for a newborn to grow, function, and

develop normally. All mammals, with the exception of humans, cease to consume milk following the weaning stage. Goat milk has a rather strong taste because it contains short-chain fatty acids, and it is white because beta carotene is converted to vitamin A in full. (2019 Yakan *et al.*; 2019 Ranadheera *et al.*). In tropical climates, goat milk is said to have more fat and ash than cow milk, even though the fat content of Holstein cow milk is comparable to Swiss goat milk. Goat milk from French-Alpine and Anglo-Nubian strains had lower amounts of Na and S and greater levels of Ca, P, K, Mg, and Cl than bovine milk. A great substitute for cow's milk is goat milk.

(Source: Lima *et al.* 2018)

### Fat

It has been shown that goat milk fat is more readily absorbed and digested than cow milk fat because MCFA, or medium-chain fatty acids, is easier to break down due to its low molecular weight, the activity of digestive enzymes, and its water solubility (Gallier *et al.* 2020). Because longer chain fatty acids and medium-chain triglycerides (MCTs) have a special metabolic ability to provide direct energy without depositing in adipose tissues, goat milk has found widespread use in clinical treatment for conditions like infant malnutrition, intestinal rectification, hyperlipoproteinemia, cystic fibrosis, epilepsy, gallstones, and coronary disease (Prosser, 2021; Mehra *et al.*, 2021). The major difference between cow and goat milk lies in their calcium content (Mehra *et al.* 2021). 122 mg/100g Ca is found in cow milk while a higher amount i.e., 134 mg/100g Ca is found in

**Table 1:** Standard composition of different milks (average values per 100 grams)

Gross	Goat	Cow	Human
Total solids (g)	12.2	12.3	12.3
Fat	4.0-4.5	3.8	4.1
Protein %	3.2	3.3	1.3
Lactose %	4.6	4.7	7.2
Ash (g)	0.8	0.7	0.2
Water %	87.5	87.7	86.7
Energy (K.cal)	70	69	68

Minerals (mg/100gm)			
K	180	150	58
Ca	129	120	34
P	106	95	14
Cl	130	95	42
Vitamins (per 100g)			
Vitamin A(IU)	185	126	241
Folic acid (mg/ L)	6	50	56

goat milk. In the context of mineral bioavailability, goat milk is highly preferred over cow milk (Mehra *et. al.* 2021c)

Like cow milk, goat milk caseins have the same four species of S1, S2, beta and kappa but in different proportions (Table 2). It has been reported that beta casein is the major component of goat milk casein, whereas, S1 is the major component of cow milk casein. Level of S2 casein is relatively higher in goat milk but total of S1 and S2 casein fractions together are lower than S1 fraction alone of cow milk. A unique feature of goat milk is the higher content in CN with respect to s1-CN than in bovine milk, as well as the minor solvation and heat stability of caseinate micelles (Haenlein, 2004; Albenzo *et al.*, 2006)

**Table 2:** Comparison of proteins of goat and cow milk

Protein Concentration (%)	Goat milk	Cow milk
Total Casein	233-46.3	24.6-28
$\alpha$ -S1 Casien	0-13.0	8-10.7
$\alpha$ -S2 Casien	2.3-11.6	2.8-3.4
$\beta$ -Lactoglobulin	1.5-5.0	3.2-3.3
$\alpha$ -Lactalbumin	0.7-2.3	1.2-1.3
Immunoglobulins	4.6 -21.4	10..0-25.7

(Source: Roy *et al.* 2020)

### Nutritional and therapeutic values of goat milk

#### **Digestibility:**

Goat milk has greater digestibility, alkalinity, buffering capacity, and some therapeutic qualities in human nutrition and medicine compared to cow or human milk.

#### **Cardiovascular diseases:**

The leading cause of death in developed nations is cardiovascular disease, or CVD. Numerous conditions affecting the heart and blood vessels are included in it, such as atherosclerosis, high blood pressure, arrhythmia, and coronary heart disease. Atherosclerotic plaque accumulation in blood vessels, which ultimately results in a cardiovascular event, is the primary cause of CVD.

#### **Effect against cancer:**

Goat milk contains a lot of conjugated linoleic acid (CLA) (Jirillo *et. al.*, 2010). In vitro models of human melanoma, colorectal (Palombo *et. al.*, 2002), and breast cancer have all been shown to benefit from CLA's anti-carcinogenic qualities against colon and mammary cancer in animal models.

#### **Reduction of lactose intolerance:**

Lactose is present in goat, cow, and human milk. Even so, a large number of lactose intolerant individuals can consume goat milk. One theory suggests that goat milk's greater digestion is the cause. According to Haenlein (2004) and Lopez-Aliaga *et. al.* (2010), goat milk is more easily and thoroughly absorbed than cow milk, leaving less undigested residue in the colon to ferment and result in the painful symptoms of lactose intolerance.

#### **Therapeutic value of goat milk:**

Lactic acid bacteria are often used as probiotic starter culture and health effects from these associated with increased lactose intolerance, a well balanced intestinal micro flora, antimicrobial activity, stimulation of the immune system and anti-tumoural, anti cholesterolaemic and anti-oxidative properties in human subjects (Slacanac *et. al.*, 2010). From a medicinal perspective, people favor goat milk since it has numerous therapeutic benefits, lower risk of allergy, is easily digested,

and functions as a buffer. Because of this, it can also be recommended for infants because it is easily digested and has a composition comparable to that of human milk (Lund *et al.* 2021; Risko and Csapo *et al.* 2019).

## SUMMARY

A fair survey has been conducted on the nutritional value and potential health consequences of goat milk, which makes it distinctive. Goat milk's typical chemical makeup is not all that different from cow milk's. Research is needed to determine how to lessen the "goaty flavor" of goat milk, which is caused by chemical or genetic alteration and lowers its acceptability. Goat milk's higher digestibility, appropriate fatty acid composition, and bioactive component concentration appear to provide benefits for the treatment or prevention of specific medical disorders.

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