

# THE SCIENCE BEHIND YAK MILK

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**T**HE yaks (*Bos grunniens*), belonging to the Bovidae family, are long-haired bovines, well adapted to high altitudes ranging from approximately 3,000 to 5,400 m in the Himalayan region of China, Mongolia, Uzbekistan, Tajikistan, Siberia, Bhutan, Tibet, India and Nepal. In India, they are mostly found in the hilly terrains of Arunachal Pradesh, Ladakh, Sikkim, and Himachal Pradesh. They are crucial to the local population economy and the ecosystem's ecological niche. Yaks are endothermic, semi-domesticated and herbivorous animals. Besides meat, they are also used for hides, milk, hair, cheese, fuel, fur, and draught purposes. According to the 2019 census, there are over 58,000 yaks in India, a report of almost 25% decline from the previous census, i.e. 2012.

## Yak Milk/Natural Concentrated Milk

The Himalayan inhabitants and yak herders mostly rely on yak milk and its byproducts (like butter and cheese) for their vitamins and nutritional needs. When compared to dairy cow milk, they are much more nutritious. The yak begins to produce milk immediately after calving. Four times a year, she-yak can go into a productive cycle; however, it can usually give birth once every two years. Yak produces approximately 150-500 kg of fresh milk per lactation, while its production depends on age, breed, body condition and parity, pasture growth and quality, time of milking and its methods and other environmental conditions.

The chemical makeup of yak milk differs from that of cow milk because yak breeding occurs seasonally and is dependent on grass growth. While cow milk varies due to year-round breeding and seasonal changes, yak milk is rich in minerals, Polyunsaturated Fatty Acids (PUFAs), and solids

like proteins, amino acids, and lactose during the major lactation period. Yaks produce the most milk in the summer and autumn since new fodder is abundant during these seasons.

Yak milk is a healthier milk option for lactose intolerant persons and those seeking a nutrient-dense milk substitute since it contains lower fat (5.5-7.5 %), lactose content (4.0-5.9%) and greater protein (4.0-5.9%) and mineral content. The pH ranges from 6.3 to 6.8; hence, it is mildly acidic. From an economic perspective, comprehending the chemical makeup of yak milk is critical to developing and promoting a successful yak product sector. Furthermore, compared to non-colostrum milk, yak colostrum has substantially higher levels of solids, lipids and proteins.

**Fatty acid:** yak milk possesses a greater percentage of Mono-unsaturated Fatty Acids (MUFAs) and Poly-unsaturated Fatty Acids (PUFAs) than Saturated Fatty Acids (SFAs). The palmitic acid (C16:0) & stearic acid (C18:0) are the most abundant SFAs, oleic acid (C18:1) is the most abundant MUFAs, and linoleic acid (C18:2) &  $\alpha$ -linolenic acid (C18:3) are the most abundant PUFAs. Additionally, it has high concentrations of Conjugated Linoleic Acids (CLA), Docosahexaenoic Acid (DHA) and Eicosapentaenoic Acid (EPA).

Yak milk has a low overall fatty acid composition, linked to a lower risk of cholesterol, Cardiovascular Disease (CVD), and an improved lipid profile. The fatty acid composition of this animal can change based on several factors, including genetics, season, animal parity, lactation stage, and grazing conditions for yaks. According to a study by Peng *et al.* 2008, multiparous animals have more unsaturated FAs than primiparous animals.