

Summary

Already staple and invaluable product of many areas of the world, goat milk and goat milk products have experienced a great increase in interest, demand, and research in recent years. Goat milk has a myriad of positive qualities as an addition to a human diet. It is a great source of many dietary metals such as calcium, phosphorus, sulfur, potassium, and magnesium as well as vitamin B1 and other vitamins. It is very low in unwanted trans fats, while featuring high levels of other more beneficial unsaturated fats. When compared with cow milk it has a higher nutrient density, thus containing more positive nutrients in smaller serving sizes. It also is lower in sugar (better for diabetic individuals), forms less phlegm, and is more easily digested than cow milk. For this reason it is very often used as a substitute for cow milk in the diets of individuals with allergies to certain cow milk proteins. It is also closer in composition to human milk and is thus accepted more readily by infant physiologies and has been used widely with great success to treat malnourishment and to promote weight gain in young children. Lastly, research has shown that in addition to the natural benefits of goat milk, milk from goats who receive all or a significant portion of their diet from natural forage behavior produce greater amounts of better quality milk than those fed predominantly by a human-made blend.

Annotated Bibliography

Goetsch 2011

Factors effecting goat milk production and quality

- Effects of production systems based on grazing and browsing vs. use of harvested feedstuffs in confinement largely depend on specific feedstuffs and plants available and being consumed. Low forage nutrient ingestion should have relatively greater impact on tissue mobilization than milk production in early than later periods of lactation, with a transition to proportionally greater change in milk production in late lactation.
- When compared, natural suckling and machine milking don't show a significant difference in terms of milk yield.
- Better forage diet quality results in harder milk yield and a more consistent milking characteristics.

Güler 2007

Levels of 24 minerals in local goat milk, its strained yoghurt and salted yoghurt (tuzlu yoğurt)

- This study examined the chemical composition and levels of a selection of minerals (Ca, K, Mg, Na, P, S, Ag, Al, As, B, Ba, Cd, Co, Cu, Cr, Fe, Mn, Mo, Ni, Pb, Se, Si, Sr and Zn) in strained and salted yogurt (also known as *yogurt cheese*, *winter yogurt*, or *tuzlu yogurt* in Turkish) as well as raw goat milk.
- The authors divided the measured mineral elements into major elements and minor elements. Out of the major elements, S (sulfur) was “the most markedly increased in strained and salted yoghurts, when compared with raw milk”. The lowest increase was shown by K (potassium). Because of the addition of NaCl (sodium chloride, salt), the Na

(sodium) concentration was highest in salted yogurt followed by Ca (calcium), P (phosphorous), S (sulfur), Mg (magnesium) and K (potassium).

- Among the minor elements, B (boron) had the highest concentration in raw milk, followed by Si (silicon), Se (selenium), Zn (zinc), Fe (iron), Al (aluminum), Ni (nickel), Sr (strontium), Ba (barium), Mo (molybdenum), Co (cobalt), Mn (manganese), Cd (cadmium), Cu (copper), Ag (silver), Pb (lead).
- The hierarchies are as follows for strained and salted yogurt respectively: B>Si>Se>Al>Zn>Fe>Ni>Co>Ba>Cr (chromium)>Sr>Cd> Mn>Mo>Cu>Ag>Pb and B>Si>Se>Ni>Zn>Al>Fe>Cu>Sr>Ba>Mo>Co> Pb>Cd>Mn>Ag>Cr.
- Gursel and associates conclude that goat milk and other products can contribute a significant amount of the above itemized elements to the requirements of a human diet. Therefore, they conclude that with respect to the examined elements, additional fortification is not necessary and the natural levels of the products are significant.
- This research also details “important information on safety and quality standards of goat milk and salted yoghurt”.

Gursel 2016

Role of milk protein–based products in some quality attributes of goat milk yogurt

- Mostly in the context of goat milk yogurt in a Turkish diet, Gursel discusses the benefits of different milk-protein fortification additives (skim goat milk powder (SGMP), sodium caseinate (NaCn), whey protein concentrate (WPC), whey protein isolate (WPI), or yogurt texture improver (YTI)) in the production of goat milk yogurt.
- Fortification with NaCn or YTI produced yogurt with “more compact structure and lower syneresis than that yogurt fortified with WPC”.
- WPC or WPI fortification resulted in much higher acetaldehyde concentration.
- WPI used “did not improve the textural characteristics of the final product”.

Haenlein 2004

Goat milk in human nutrition

- In a wide-ranging review of nutritional research, Haenlein discusses convincing evidence for “a special value of goat milk in human nutrition and well being.” Among the discussed topics:
- Goats show the largest increase in numbers and milk production since 1980
- Treatment of Cow Milk Allergy (a common disease with an overall prevalence of 2.5% in children under 3 and with increased prevalence in younger children) with goat milk has proven extremely successful in multiple studies both short- and long-term.
- As knowledge increases, some goats are being selected for that do not produce milk with the protein polymorph α -s-1-casein (which has been shown to be the cause of many Cow Milk Allergies), but instead with α -s-2-casein. Milk with this quality “has less curd yield, longer rennet coagulation time, more heat lability, and weaker curd firmness, which also may explain the benefits in digestibility in the human digestive tract (Ambrosoli et al., 1988).”

- Multiple studies of malnourished children recommend treatment with goat milk as a “useful alternative to cows milk” for the treatment of such cases, and it has show to be significantly more effective in assisting weight gain than cow’s milk.
- Goat milk has a higher nutrient density than cow milk. The “daily dietary nutrient recommendations for essential amino acids” for adults could be met or exceeded by consuming just over half as much goat milk as the required amount of cow milk.
- “Goat milk exceeds cow milk in monounsaturated (MUFA), polyunsaturated fatty acids (PUFA), and medium chain triglycerides (MCT), which all are known to be beneficial for human health, especially for cardiovascular conditions.” These levels fats beneficial to human health can be further increased by high levels of well-overseen foraging. By the same process, levels of undesirable *trans*-fats can be decreased.
- The fatty acid composition of goat milk differs distinctly from that of cow milk and the characteristic beneficial acids present (many named after goats themselves) are on medical record as attested and efficient treatments for many afflictions “including malabsorption syndromes, chyluria, steatorrhea, hyperlipoproteinemia, intestinal resection, premature infant feeding, non-thriftiness of children, infant malnutrition, epilepsy, cystic fibrosis, coronary by-pass, and gallstones.”

Kalyankar 2016

Goat: milk

- Goat Milk exceeds Cow Milk “in MUFAs, PUFAs, and MCTs, which all are known to be beneficial for human health, especially for cardio-vascular conditions. This biomedical superiority ... has great potential in justifying the uniqueness of Goat Milk in human nutrition and medicine for treating the various gastrointestinal disorders and diseases, besides its value in alleviating Cow Milk allergies.
- “Fatty acid composition of Goat Milk fat can also be changed toward even more of the beneficial fatty acids by different regimes of feed supplementation to goats including changes of forage-to-concentrate ratios.”
- Conclusions:
 - “Goat Milk has a high nutritional content.
 - It is a rich source of calcium, phosphorous, chlorine, and vitamins.
 - It is highly digestible and has a mild laxative effect.
 - It is a good source of vitamin B1, which is useful in relieving symptoms of stress (neurotic indigestion, constipation, and insomnia).
 - It may be used to replace Cow Milk for those suffering from allergy.
 - It has a higher fat content than Cow Milk and low cholesterol levels than Cow Milk, hence suitable for people with high blood pressure.
 - It is lower in sugar than Cow Milk, hence good for those suffering from diabetes.
 - Goat Milk is closer to human milk and is therefore easily accepted especially by those young or frail. It has an alkaline reaction like mother’s milk.
 - It does not form mucous (phlegm) and is therefore better tolerated by asthmatics and those with allergies.”

