



A Monthly e Magazine
ISSN:2583-2212
May 2024 Vol.4(5), 1797-1802

Popular Article

Equines milk's nutritional characteristics

Suruchi Sharma*¹ And Sahil Sharma²

¹PhD Scholar Animal Biochemistry, ICAR-National Dairy Research Institute, Karnal, Haryana,

²M.V.Sc. Animal Nutrition DGCN COVAS, CSKHPKV, Palampur

<https://doi.org/10.5281/zenodo.11228788>

Introduction

A food item or component that provides health benefits to the body, including illness prevention and treatment, is known as a nutraceutical. As a nutritious beverage, milk is mostly made from dairy cows and buffaloes, while it is also used in some regions of the world from goats, camels, and donkeys. Although it is commonly known that a newborn's mother's milk provides the optimum nutrients, some babies may not receive all of their breast milk in the first few months of life. As a result, a replacement that has similar composition and qualities to human milk is required. Donkey's milk is said to have about the same nutritional value as breast milk, making it advantageous for infants who may not be able to consume their mother's milk because of illnesses or other conditions.

Using the techniques of molecular genetics science, it appears that not much research has been done on Indian donkeys. Moreover, donkey milk was not included in the list of acceptable milk. Still, the vast majority of Indian donkeys remain unidentified. Only three donkey breeds—the Halari, Spiti, and Kachchhi—are found in India. According to the most recent census, the overall number of donkeys in the nation dropped by 61.0%, to 0.12 million as of 2019. India possesses valuable horse DNA, and horses have historically played a major role in the advancement of civilization. India has approximately 0.54 million horses according to the 2019 livestock census. A significant number of equines including horses, ponies, mules and donkeys support agricultural and semi-urban communities.

It is necessary to profile the milk of donkeys in India, as it has been noted that horse milk has

amazing therapeutic benefits, may be used as a treatment for allergies and metabolic disorders, and has anti-aging properties. Donkey milk is offered for sale in various regions of the nation for therapeutic purposes. Donkey milk providers receive a substantial income from the sale of their product, which is in high demand. Cosmetics and health mixes made from donkey milk (DM) can be a significant source of income for Indian horse farmers. The general population is quite aware of the new opportunity to increase horse owners' revenue.

In the past, milk from cows, buffalo, sheep, and goats, as well as their fermented milk products, have been important sources of nutrition for both adults and children. But in the past ten years, donkey (*Equus asinus*) milk has gained popularity all over the world as a substitute for human milk, especially for young children who have a cow's milk allergy. Studies have indicated that there are similarities between the high protein and lactose content of DM and the lower amounts of low-fat in it. Scientists are interested in using DM's physicochemical qualities to produce food products for human consumption because of its similarities to human milk, low allergy features in children, potential adult medicinal uses, and industrial applications. Additionally, the global growth of milk allergies forces culinary and medical professionals to identify a milk substitute that is as safe to drink as possible and most similar to human or bovine milk. Because of these unique features, DM appears to be an excellent replacement for this issue. For those who are intolerant to highly hydrolyzed milk-based formulas, as well as for the majority of children with cow's milk protein allergy (CMPA), DM can be a good substitute for human milk. The low allergenicity of DM has been linked to its low casein to whey ratio (0.66 - 1.33) and low total protein content (1.5 - 1.8 g/100g). It is thought that this ratio is crucial in sensitizing the protein fractions in cow milk, reducing their ability to cause allergies; the lower the value, the less risk for allergies.

The production of milk in equines is very different from that of traditional dairy animals, particularly when it comes to the limited supply of milk. Due to the limited size of the equine mammary gland (maximum 2.5L), some milk should be left for the foal, and milking can take place two or three hours after the foal is separated. After foaling, donkeys produce milk three times a day for 20 to 90 days. For roughly six to seven months, a female gives birth to 0.5 to 1.3 litres of milk per day. Among the functional proteins found in donkey milk are substances like lactoferrin and lysozyme that are effective against microbes. Donkey milk has a lactoferrin concentration that falls in between that of human milk and cow milk. Donkey milk had a mean value of 1.0 mg/ml of lysozyme, which varied significantly during the course of lactation and was found to be higher than that of human and bovine milk (0.12 mg/ml) (traces). Depending on the analytical technique (chemical or



microbiological), lysozyme can be found in large quantities in donkey milk (1.0 mg/ml to 4 mg/ml). It is also present in human milk (0.12 mg/ml), but only in trace amounts in cow and goat protease, and it may be crucial for the intestinal immune response. Human-like leptin, at levels comparable to human milk (3.35 to 5.32 ng/ml), is present in donkey mammary secretions. Frozen donkey milk also contained the bioactive peptides insulin, such as growth factor 1, ghrelin, and triiodothyronine. From a nutraceutical perspective, these and many other compounds found in human milk are gaining more and more interest due to their possible direct involvement in controlling food intake, metabolism, and baby body condition.

Given that 90% of newborns with food allergies, such as those with a general food allergy such as breast milk protein allergy, which affects around 3% of children during the first three years of life, can tolerate donkey milk, it can be considered naturally hypo-allergenic milk. When it comes to lactose, proteins, minerals, and omega-6 and omega-9 fatty acid composition, donkey's milk is comparable to human milk. Donkey milk is low in fat but high in lactose.

Advantages of DM for health

Because of its purported advantages in both health and illness, people are becoming increasingly interested in using DM as a nutritional source. In addition to strengthening host defence, boosting immunity, regulating the healthy microbiota within the duct, and protecting against a wide range of gram-positive and gram-negative bacteria, DM also has antibacterial qualities that help prevent autoimmune and inflammatory diseases in both adults and children. Clinical evidence supports the use of DM supplements in the pretreatment and prevention of a number of chronic conditions, such as type 2 diabetes, inflammatory bowel disease, asthma, and Crohn's disease. With these qualities, DM can be used as a hypoallergenic substitute for human milk in the case that an infant develops a hypersensitivity to cow's milk in the early stages of infancy. It can also be a nutritious and healthful food for growing children and the elderly.

Lactose improves the GI tract's ability to absorb calcium and phosphorus, which in turn promotes osteogenesis and modifies mineral deposition in the bones to avert the development of osteoporosis. DM is an excellent medium for the amplification of advantageous strains of *Lactobacillus rhamnosus* that have positive effects on gut bacteria because of its high lactose content. The compact size of the udder, which reduces its exposure to microbial infection, the anatomical position of the udder, the physiological state of donkeys, the presence of antimicrobial constituents such as immunoglobulins, lysozyme, lactoferrin, and lactoperoxidase, and other factors could all contribute to the relatively low microbial count of DM. The low protein content of DM (1.5–1.8%),



which is comparable to that of human milk (0.9–1.7%), offers significant compensation because formula-fed infants who consume more protein tend to experience an early adiposity rebound. The amounts of protein, lactose, and total whey protein in donkey and human milk are comparable. Numerous factors, including as gestational age, lactation stage, nutrition, breed, season, and udder health condition, affect the intra-analysis variances and individual changes in compositional levels.

DM-produced dairy products

The public is becoming more interested in dairy products manufactured with DM since they are regarded as functional foods that are high in essential milk components. Milk items that include DM include cheese, ice cream, fermented milk products, and milk powder used in baby formula.

The inability of the curd to stiffen up after renneting makes it challenging to create cheese from DM. This characteristic results from DM's low casein and total solids content. However, additional research indicates that cheese can be made from DM by a variety of methods, including the use of transglutaminase, particular rennet types, unique coagulation circumstances, and fortification with milk from other species. Seasonal variations in milk output have led to a rise in market demand, which has made DM powder increasingly vital to meet. DM powder is made using a variety of methods, including as fluid bed drying, freeze-drying, and spray drying. DM is also utilised in the manufacturing of probiotic and medicinal kefir, as well as products that resemble fermented yoghurt. Because of its high lysozyme content and low microbial load, DM is often used in fermented food preparations.

Developing dairy products based on DM that improve human health is prioritised in light of the functional qualities of DM. According to recent research, DM and its derivatives are effectively utilised in the production of cheese, ice cream, kefir, yoghurt, milk powder, and other fermented foods.

Therapeutic properties of donkey milk

Cows are the primary dairy animal species globally due to their abundance of lacteal secretions, which are necessary to supply the need for milk and other dairy products for human nutrition. But newborns with cow milk protein allergies (CMPA), whose incidence was estimated to be between 5% and 15%, should not drink cow milk. This includes infants who exhibit symptoms associated with negative reactions to cow milk protein. Donkey milk has a strong palatability and has been used successfully in clinical tests with children who have CMPA, or cow's milk protein allergy. Its composition is more similar to that of human milk than ruminant milk, but it contains very little lipids; a toddler's diet needs to provide enough lipid integration. Recently, there has also been an increase in interest in the potential function that donkey milk may play role in preventing



cardiovascular disease and atherosclerosis. Children with CMPA may have a high tolerance to donkey milk because of the milk's major allergenic components; in fact, the milk's ability to sensitize may be attributed in part to its low casein content and casein: whey protein ratio. The amount of casein fractions, the primary structure of the milk proteins, and the variations in the digestibility of possible milk allergens are a few other variables that may also contribute to the good tolerance of donkey milk but have not yet been well examined. Furthermore, the lactose content serves as a substrate for the microbial development in the gut that has positive health effects. Beyond what is provided by nutrition alone, milk actually contains a variety of bioactive chemicals with unique qualities connected to the development, growth, and survival of newborns. The primary antimicrobial proteins found in milk include lysozyme, immunoglobulins, lactoferrin, and lactoperoxidase. The protein known as alpha-lactalbumin possesses antiviral, anticancer, and anti-stress properties. Cow's milk is the most popular meal to give infants during their weaning process and is frequently used to replace human milk. However, it is also one of the most prevalent food allergies in children and can cause an aberrant immune response. The most prevalent food allergy in early childhood is cow milk protein allergy (CMPA), which affects 2 to 5% of children under the age of three.

The benefits of using donkey milk as a moisturizer are astounding. Donkey milk's antioxidant properties work in tandem with its cleansing and moisturizing properties to prevent ageing in cosmetics. Donkey's milk's fat content softens and nourishes the skin. Donkey milk's medicinal and cosmetic benefits appear to be confirmed these days. Donkey milk has anti-aging, anti-oxidant, and regeneration substances that are naturally active in hydrating and preventing skin ageing. It is also rich in vitamins and polyunsaturated fatty acids. Low quantities of saturated fatty acids and high levels of essential fatty acids define the lipid fraction. Donkey milk has a higher concentration of unsaturated fatty acids than ruminant milk, which makes it more beneficial in preventing inflammatory, autoimmune, and cardiovascular disorders. Donkey milk can also be used medicinally for a variety of conditions, including fevers, asthma attacks, infectious infections, liver issues, and more.

Future perspectives

The donkey's milk was acknowledged as the fountain of youth, but it was scorned for its "asinine" qualities. Due to an increasing number of research reports published globally, donkey milk is currently considered a potential "gold mine" in the future. In India, small and marginal farmers who lack land rely on donkeys for their livelihood, in contrast to the rich Western societies. The majority of donkeys are used by nomads and laborers in brick kilns, who have no idea how to use the animals for anything other than pack and load transportation. It may greatly improve their economy if these



donkey owners and small-scale donkey farmers were made aware of the advantages and goods that come with donkey milk. With careful breeding, milking, and product marketing, the possibilities for the future are extremely promising.

References

Y Pal, A Bhardwaj and R A Legha. Nutraceutical Properties of Equine Milk, IVth International Conference in Hybrid Mode on Innovative and Current Advances in Agriculture & Allied Sciences (ICAAAS-2022), pp 50-54

