



The Forgotten Equine: Donkey Farming in India—From Working Animal to Emerging Rural Enterprise

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doi.org/10.5281/VeterinaryToday.22893398

Abstract

Donkeys (*Equus asinus*) have been associated with human livelihoods for thousands of years, particularly as working animals in rural transport and agricultural activities. However, the rapid mechanisation of traditional donkey-dependent occupations has contributed to a substantial decline in India's donkey population, raising concerns regarding the conservation of indigenous genetic resources and the sustainability of traditional livelihoods. In this context, organised donkey farming is emerging as a potential specialised rural enterprise, with increasing scientific interest in breeding, conservation and donkey milk production. Donkey milk possesses a distinctive nutritional profile characterised by relatively high lactose, comparatively low fat and protein, and a notable proportion of whey proteins. It also contains bioactive proteins such as lysozyme, lactoferrin and α -lactalbumin, which have been investigated for their antimicrobial, antioxidant and immunomodulatory properties. Studies have explored its potential as an alternative milk source for selected individuals with cow's-milk-protein allergy, although current evidence is insufficient to regard donkey milk as a therapeutic agent or replacement for established medical and nutritional interventions. Sustainable development of donkey farming in India will therefore require an integrated approach involving animal welfare, scientific nutrition, veterinary healthcare, genetic-resource conservation, hygienic milk production and realistic market assessment. Donkey farming should be viewed not as a guaranteed high-profit venture, but as an emerging niche opportunity in which conservation and responsible livestock production can complement each other.

Keywords: Donkey milk; Nutritional composition; Bioactive proteins; Cow's milk protein allergy; Rural entrepreneurship.

A Livestock Species in Decline

India's donkey population has fallen sharply over the past decade. According to the Government of India's livestock statistics based on the 20th Livestock Census, the donkey population declined from approximately 0.32 million in 2012 to 0.12 million in 2019, representing a 61.23% decline. The decline has not been uniform across the country. The source material used for this article identifies substantial reductions in several

traditionally important donkey-rearing states, including Uttar Pradesh, Rajasthan, Gujarat, Andhra Pradesh, Bihar and Maharashtra. This is not simply a numerical change in livestock statistics. A rapid population decline can also threaten locally adapted genetic resources and reduce the breeding base available for future development.

Why Are India's Donkeys Disappearing?

The most obvious explanation is

mechanisation. Donkeys were traditionally used for transporting construction materials, agricultural goods and other commodities. Today, tractors, mini-trucks and three-wheeled cargo vehicles can perform many of these tasks more rapidly and efficiently. The brick-kiln industry is another example. In several regions, donkeys historically played an important role in transporting bricks and materials. Increasing mechanisation has progressively reduced the demand for animal labour. Mechanisation itself is not a problem. It is a natural part of economic development. The challenge arises when the traditional economic value of an animal disappears without the development of alternative, sustainable production systems. There are also concerns regarding illegal slaughter and trafficking for donkey hides, driven partly by international demand for hide-derived products such as ejiao, a traditional gelatin preparation. Such pressures can further affect already declining populations. These factors illustrate an important point: the donkey is no longer disappearing simply because people do not need it. It is disappearing because the economic system around it is changing.

More Than a Beast of Burden

The future value of the donkey may not lie in replacing tractors or trucks. Instead, its potential may lie in specialised livestock production, genetic-resource conservation and niche products. India possesses indigenous donkey populations adapted to different ecological and management conditions. The National Bureau of Animal Genetic Resources (NBAGR) recognises and documents India's animal genetic resources, including donkey populations. Such populations should not be viewed merely as remnants of traditional agriculture. Genetic diversity provides a reservoir of traits that may become valuable in the future, particularly traits related to environmental adaptation, resilience and efficient utilisation of limited resources. Conservation is therefore not simply about preserving history. It is about maintaining options for the future.

Donkey Farming: A New Rural Enterprise?

With the decline of traditional working roles, attention is increasingly turning towards organised donkey farming. Potential components of a modern donkey enterprise include: breeding and conservation; specialised milk production; production of value-added dairy products and genetic-resource conservation. However, donkey farming should not be promoted as a guaranteed high-profit business. Unlike cattle or buffaloes, donkeys have relatively low milk yields. Their

economic potential is therefore more likely to come from specialised and higher-value markets rather than bulk production. The success of such a system would depend on animal health, breeding efficiency, milk quality, processing facilities, market access and consumer demand.

The Foundation: Proper Animal Management

Whether donkeys are maintained for breeding, milk production or conservation, their welfare must remain the foundation of the enterprise. Adequate housing should provide protection from extreme weather, good ventilation, sufficient space for movement and a clean, comfortable resting area. Donkeys are social animals and should not routinely be maintained in prolonged isolation. Hoof and dental care are also important. Regular hoof trimming, monitoring for lameness and appropriate dental examination are necessary components of responsible management.

Nutrition: An Efficient but Easily Mismanaged Animal

One of the donkey's most remarkable biological characteristics is its ability to efficiently utilise fibrous, relatively low-energy forage. However, this does not mean that donkeys can simply be fed anything. Excessive intake of energy-rich feed can predispose donkeys to obesity and metabolic problems. Diets should therefore be formulated according to forage quality, body condition, physiological stage and workload. Sudden dietary changes should be avoided, and clean drinking water should always be available. A donkey does not need a rich diet to be healthy; it needs an appropriate diet..

Donkey Milk: Why Is Science Interested?

Among the emerging possibilities associated with donkey farming, donkey milk has attracted perhaps the greatest scientific attention. Recent reviews have highlighted its unusual nutritional composition and bioactive protein profile. Donkey milk generally contains relatively low fat and protein, high lactose, and a relatively high proportion of whey proteins compared with bovine milk. It also contains bioactive proteins including lysozyme, lactoferrin and α -lactalbumin. Its composition has some similarities to human milk, which is one reason researchers have investigated its potential nutritional applications. However, similarity does not mean that donkey milk is equivalent to human breast milk. This distinction is particularly important when discussing infant nutrition.

What Makes Its Protein Profile Interesting?

The proteins in donkey milk are more than simple sources of amino acids. Lysozyme is an

antimicrobial enzyme that can damage bacterial cell walls. Lactoferrin is an iron-binding protein with antimicrobial and immunomodulatory functions. α -lactalbumin is involved in lactose synthesis and is also an important whey protein. Recent research has demonstrated that the concentrations of these proteins can change during lactation. A 2025 study analysing 153 donkey-milk samples from five farms found that milk composition changed substantially across lactation. Total protein and total solids declined as lactation progressed, while lactose remained comparatively stable. The study also documented different patterns for lactoferrin, α -lactalbumin, β -lactoglobulin and lysozyme. This finding has an important practical implication: Donkey milk is not a chemically static product. Breed, stage of lactation, nutrition, management and processing can all influence its composition.

Donkey Milk and Human Nutrition

Recent research has generated considerable interest in donkey milk as a specialised food. A 2025 review described donkey milk as having high lactose, relatively low fat and protein, a distinctive whey-protein profile and several micronutrients of nutritional interest. The same review emphasised that low milk yield and high production costs remain major barriers to commercialisation. A separate 2025 review reported that donkey milk contains approximately 55–65% whey proteins among its total milk proteins, although exact values vary among studies and production conditions. It also highlighted its low-fat content and presence of vitamins and minerals. These characteristics make donkey milk scientifically interesting, but they should not be converted into exaggerated health claims.

Could Donkey Milk Help Children with Cow's-Milk-Protein Allergy?

This is probably the most clinically relevant area of donkey-milk research. Several studies have investigated donkey milk as a possible alternative milk for selected children with cow's-milk-protein allergy (CMPA). Its relatively low casein-to-whey ratio and distinctive protein composition may explain why some children with CMPA tolerate it better than conventional bovine milk. A review of clinical studies reported relatively high tolerability rates among selected children with cow's-milk allergy. However, this evidence needs to be interpreted carefully. Donkey milk should not be described as a treatment or cure for cow's-milk allergy. It may be considered a potential alternative food in selected circumstances, but its use in infants with food

allergy requires professional medical supervision. Current evidence is not sufficient to replace established clinical management protocols.

Is Donkey Milk a Medicine?

This is where popular discussions often move faster than science. Laboratory and experimental studies have reported antimicrobial, antioxidant, anti-inflammatory and immunomodulatory activities associated with donkey milk and its bioactive components. These findings are scientifically interesting. But there is a major difference between: “A milk protein demonstrates biological activity in a laboratory experiment” and “Drinking the milk treats a disease in humans.” The second claim requires evidence from well-designed clinical trials. A 2024 review specifically concluded that donkey milk has promising health-related properties but emphasised that the mechanisms and clinical significance of many proposed therapeutic effects remain insufficiently established. Similarly, earlier reviews have called for additional randomised human clinical trials before strong therapeutic conclusions can be drawn. Therefore, the scientifically appropriate description is: Donkey milk is a nutritionally distinctive functional food with promising biological properties, but its therapeutic applications remain an active area of research.

Antimicrobial and Antioxidant Potential

The presence of lysozyme and lactoferrin has attracted particular interest. Lysozyme can exert antibacterial effects, while lactoferrin has iron-binding and antimicrobial properties and may influence immune responses. Donkey milk also contains antioxidant-related compounds that have been investigated experimentally. These properties may partly explain why donkey milk is being studied in the context of functional foods and nutraceutical research. However, the available evidence should not be interpreted to mean that donkey milk can replace antibiotics or conventional medical treatment. At present, the strongest scientific position is that these components provide a basis for further investigation, rather than definitive proof of therapeutic efficacy.

Conclusion

The future of donkey farming in India is unlikely to resemble its past. The donkey may never again be as important for transporting bricks or agricultural materials as it was before mechanisation. That chapter of its history is gradually closing. But another chapter may be opening: Research into donkey milk is expanding.

Scientists are characterising its proteins, lipids, carbohydrates, vitamins and bioactive components. Researchers are investigating its potential role in specialised nutrition and functional foods. At the same time, interest in indigenous donkey genetic resources is creating new opportunities for conservation.

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