AD-15/10/2025-AHC
Government of India
Ministry of Fisheries Animal Husbandry, Dairying
Department of Animal Husbandry and Dairying
Stilt Floor, Chanderlok Building
36, Janpath, New Delhi-110001
Dated: 29th September, 2025

Subject: Invitation for Comments on Draft Camel Policy Paper

I am directed to inform that the Department of Animal husbandry, Ministry of Fisheries, Animal Husbandry and Dairying, in consultation with FAO has developed a draft policy paper on camel. The Department proposes to release the draft policy paper for public and stakeholder comments, to be submitted within 15 days from the date of issuance of this letter.

Any person desiring to make any suggestion or objection in respect of said draft camel policy paper may forward the same for consideration of this department within period specified above through email to pramod.kaushik70@gov.in

Encl: Draft Camel Policy Paper

Regards

(Dr. Pramod Kumar Kaushik)
Assistant Commissioner

NIC for uploading on website

Camel Policy Paper

DRAFT FOR COMMENTS

Contents

Executive Summary

India's camel economy—once a cornerstone of rural livelihoods and desert ecosystems—is now at a critical juncture. Historically, camels have played a vital role in the socio-economic and ecological fabric of India's arid regions, particularly in Rajasthan and Gujarat. They served not only as draught animals in agriculture and transport, but also as important sources of nutrition, income, and cultural identity. Despite their enduring value, India's camel population has declined by more than 75% since the 1970s, a decline driven by economic transitions, shrinking rangelands, legal constraints, and declining institutional support.

Camels are exceptionally suited to dryland ecosystems. Their low water needs, selective grazing habits, and soft-padded hooves help prevent desertification and preserve fragile habitats. They are deeply embedded in the cultural lives of pastoral communities such as the Raika, Rabari, and Fakirani Jat. Camels support rural livelihoods not just through transport and tillage but also through dairy, tourism, and organic farming. Camel dung enriches soil in arid regions. Camel milk, valued for its nutritional and therapeutic properties, is emerging as a functional food in niche health markets. Camel-based tourism, including safaris and cultural fairs, continues to offer seasonal economic opportunities. Yet the economic shift toward mechanization and alternative livestock, combined with outdated legal restrictions and land use changes, has undermined camel viability. Youth from pastoralist communities are increasingly moving away from camel herding, leading to the loss of traditional knowledge and weakening of community institutions. This paper identifies thirteen interconnected drivers contributing to the camel's decline—spanning economic, environmental, social, and policy dimensions. These include the collapse of traditional roles, reduced grazing access, climate impacts, restrictive legislation, underdeveloped markets, and exclusion from veterinary and development services.

Policy efforts so far have been limited in scope, fragmented across ministries, and under-resourced. While some state-level programs offer selective support, for instance, camel milk procurement in Gujarat or health incentives in Rajasthan, there is no national-level coordination or strategy. Camels are absent from major schemes on nutrition, climate adaptation, and livestock enterprise development. Community participation, especially from camel herder groups, is minimal in policy design.

To address these systemic challenges, the paper presents thirteen strategic recommendations. These include launching the National Camel Sustainability Initiative (NCSI), securing grazing rights, strengthening camel dairy value chains, reviving camel-based tourism, and introducing veterinary and genetic conservation programs. Additional priorities include youth skilling, herder empowerment, public awareness campaigns, legal reforms, and government procurement mechanisms to restore institutional demand.

Camels are not relics of the past - they are climate-resilient, economically viable, and ecologically essential livestock. With the right blend of policy innovation, community participation, and investment, India can revitalize its camel economy—linking traditional knowledge with sustainable development and ensuring a future where camels once again thrive in the arid heartlands of the country.
This paper also presents a dedicated section titled “Camel Milk: Production, Nutritional, and Commercial Prospects” delves into the barriers for commercialization of camel milk.

Introduction

Camels have been an integral part of India's livestock and rural economy, playing a crucial role in transportation, agriculture, and cultural traditions. Historically, camels have supported desert communities by providing mobility, draught power, milk, and meat, making them an invaluable asset in arid and semi-arid regions (Köhler-Rollefson, 2001). However, in recent years, the camel population has witnessed a significant decline due to changing agricultural practices, urbanization, and loss of grazing lands. According to the 20th Livestock Census of India, the camel population declined by nearly 37% between 2012 and 2019, with Rajasthan and Gujarat, the primary camel-rearing states, being the most affected (Government of India, 2019). This decline underscores the urgent need for policy interventions to ensure the conservation and sustainable utilization of camels.

India's semi-arid and arid regions, particularly in states like Rajasthan and Gujarat, are home to one of the most iconic and ecologically significant domesticated animals—the camel. Once revered as the "Ship of the Desert," camels historically played an indispensable role in sustaining the livelihoods and cultures of communities and ecological balance of these fragile landscapes. However, despite their resilience and multipurpose utility, camel populations have been steadily declining, raising concerns about the future of dryland communities and the ecosystems they inhabit. Understanding the multifaceted importance of camels is crucial for shaping policies and interventions aimed at their conservation, value chain development, and integration into climate-resilient livelihood strategies.

Camels in India's Drylands

Ecological Role of Camels in India's Semi-Arid and Arid Zones

Camels are ecologically indispensable to the semi-arid and arid ecosystems of India, particularly in regions like Rajasthan, Gujarat, and Ladakh. Their unique physiological adaptations make them one of the few livestock species capable of thriving in these harsh climates, where water is scarce, temperatures are extreme, and vegetation is sparse.

Camels can thrive with the least water, often surviving days without drinking—an adaptation that reduces pressure on dwindling water sources in drought-prone areas. Their high endurance allows them to travel long distances in search of forage, enabling pastoralists to utilize wider rangelands without depleting localized grazing areas.

Unlike cattle or goats that often overgraze and contribute to desertification, camels are selective browsers. They feed on hardy shrubs and trees, including many thorny desert species, thus playing a vital role in maintaining vegetative diversity and supporting the regeneration of native flora. This behaviour also reduces competition with other livestock, making camels an environmentally sustainable option for integrated dryland livestock systems.

Moreover, camels have soft, wide-padded feet that minimize soil compaction and erosion, a critical advantage in desert terrain prone to degradation. Their manure, though less in quantity, is nutrient-rich and supports organic soil health when used as fertilizer, contributing to low-input agricultural practices in marginal lands.

As climate change increases the vulnerability of dryland ecosystems, the ecological services provided by camels become even more relevant. Promoting camel husbandry supports sustainable land management, reduces ecological footprints, and enhances the resilience of pastoral communities to environmental shocks.

Cultural and Social Value

Camels are not just livestock in India's semi-arid and arid regions—they are cultural icons that embody the traditions, identity, and heritage of pastoralist communities. Among the most prominent of these are the Raika, Rabari, Fakirani Jat, and Manganiyar communities of Rajasthan and Gujarat, who have been the traditional keepers and breeders of camels for generations. These communities share a sacred bond with camels; for example, the Raikas believe they were created by Lord Shiva specifically to care for camels, underscoring a spiritual duty that transcends economic utility.

> *The Bactrian camel found in Ladakh region of India is believed to have arrived in Ladakh from the neighboring Tibetan region during the 17th century. This historical connection adds to the cultural heritage of the region. The Bactrian camel is not only a cultural icon but also a vital component of the region's social and economic fabric. Its role in tourism and conservation highlights the adaptive strategies of local communities in preserving their heritage while fostering economic growth.*

Camels occupy a central place in social life, rituals, and customs. They are often presented as dowry in marriages, paraded during festivals, and featured in local art, textiles, and music. Annual events such as the Pushkar Camel Fair not only serve as vibrant cultural expressions but also act as economic platforms that bring together pastoralists, traders, tourists, and artisans. These gatherings are vital in preserving intangible cultural heritage, promoting intergenerational knowledge transfer, and providing visibility to camel-rearing communities.

However, the ongoing decline in camel populations—exacerbated by mechanization, shifting land use, and loss of grazing grounds—is leading to a gradual erosion of these cultural practices and social structures. Without timely policy intervention, India stands to lose not only a unique animal species, but also centuries-old cultural legacies intrinsically tied to sustainable desert life.

Livelihood Importance

Camels serve as a cornerstone of livelihood security in India's dryland economies, particularly for resource-poor, landless, or smallholder pastoralists. Their multifaceted contributions span across subsistence, income generation, and employment, making them a critical asset for resilience in marginal environments.

a. **Transportation:** Camels have been used for transportation and military purposes for centuries, especially in regions with desert or arid landscapes. Camels are well-suited for traversing long distances and harsh conditions and can transport supplies and equipment in areas where other vehicles cannot easily travel. Camel has been offering low-cost transportation, particularly in desert villages.

b. **Agriculture and livelihood labour:** Camels play a crucial role as draught animals in dryland farming systems, particularly in regions where mechanized equipment is unaffordable or impractical. They are used to plough fields and to operate traditional water-lifting devices to draw water from wells. In many arid and semi-arid regions of India, camels are relied upon to pump water for household use, livestock, and irrigation—especially where electricity or motorized pumps are unavailable. This labor-intensive function supports both farming and domestic activities, enhancing agricultural productivity and water access in resource-scarce environments.

c. **Manure:** Camel dung is used as an organic fertilizer, improving soil fertility and supporting sustainable agricultural practices in arid farming systems. It contributes to circular economy models within pastoral communities.

d. **Camel Milk:** Camel milk is a vital nutritional and economic resource for pastoral communities living in arid and semi-arid regions. It is uniquely suited to these harsh environments, where conventional dairy sources are limited or unviable. In dryland economies, camel milk thus contributes to both subsistence and income generation, enabling pastoral families to diversify their livelihoods and build resilience against climate and market shocks.

e. **Eco-Tourism and Cultural Enterprises:** Camel safaris, heritage tourism, and handicrafts related to camel culture (such as camel leather and wool products) offer additional streams of revenue. These activities attract both domestic and international tourists, creating local employment opportunities for guides, artisans, and transporters. The Bactrian camels, which were primarily used for transportation and carrying loads in the remote regions of Ladakh have evolved into a new role of being used for camel safaris particularly in the Nubra Valley. Tourists flock to the region to experience rides on these unique camels, contributing to the local economy and preserving the cultural practice. Its role in tourism and conservation highlights the adaptive strategies of local communities in preserving their heritage while fostering economic growth.

f. **Asset Security and Mobility:** For nomadic and semi-nomadic communities, camels are a form of mobile capital. They can be moved across long distances during droughts and serve as a hedge against crop failures or market shocks. This flexibility makes camel ownership particularly valuable in climate-vulnerable contexts.


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g. **Patrolling in international border:** The Indian Army and Border Security Force (BSF) utilize camels for patrolling along the Line of Actual Control (LAC) in Ladakh and the Indo-Pak border in Rajasthan, respectively.

Key Camel Breeds in India

India is home to two distinct species of camels: the single-humped dromedary (Camelus dromedarius) and the double- humped Bactrian camel (Camelus bactrianus). These species are uniquely adapted to different ecological zones—dromedaries thrive in the hot, arid, and semi-arid regions such as Rajasthan and Gujarat, while Bactrian camels are suited to the cold desert and high-altitude conditions of Ladakh. As detailed above, camels play a critical role in the livelihoods, culture, and transport systems of pastoralist and rural communities. Each species—and within them, each breed—exhibits specific characteristics tailored for distinct uses, ranging from draught power and milk production to wool, tourism, and ceremonial roles. Their resilience, low water requirements, and ability to traverse difficult terrains make them indispensable assets in India's marginal and climate-vulnerable landscapes.

Dromedary Camels – Rajasthan and Gujarat

The single-humped dromedary camels are predominantly found in Rajasthan and Gujarat, each with unique adaptations that reflect the ecological and cultural diversity of their native regions.

a. **Bikaneri (Rajasthan):** Known for its strength and endurance, this breed is commonly used for cart pulling and heavy draught work. It is also a prominent breed in religious processions and traditional festivals.

b. **Jaisalmeri (Rajasthan):** Renowned for its stamina and speed, this tall and slender breed is used for riding, camel safaris, and long-distance travel, especially in the Thar Desert.

c. **Mewari (Southern Rajasthan):** This is a dual-purpose breed, utilized for both milk production and draught. It is especially valuable in hilly and semi-arid zones and is gaining attention for its camel milk yield.

d. **Kachchhi (Gujarat):** A strong draught breed known for its ability to work in saline and arid conditions, the Kachchhi camel is commonly used for ploughing and carting in the Rann of Kachchh and surrounding regions.

e. **Kharai (Gujarat):** Unique among camel breeds, the Kharai camel is adapted to coastal and mangrove ecosystems. It is an excellent swimmer, capable of crossing creeks and feeding on mangroves. This breed is found in the Kachchh and Bhavnagar coastal belts and is especially valuable to migrant herders who rely on marine and semi-marine grazing lands.

Bactrian (Camelus bactrianus) – Ladakh

The double-humped camel, or Bactrian camel, is found exclusively in the high-altitude cold desert of Ladakh. This unique species is exceptionally well adapted to Ladakh's extreme environment, where freezing temperatures, rugged terrain, and limited vegetation make survival difficult for most other livestock. In conditions where cattle, goats, and even single-humped camels struggle, the Bactrian camel thrives—making it a critical resource for transport, local livelihoods, and cultural identity in the region.

The Bactrian camel plays a vital role in supporting remote communities by carrying heavy loads, navigating challenging mountainous routes, and surviving on sparse, cold desert vegetation. Its physiological adaptations—such as a thick coat, two fat-storing humps, and capacity to endure long periods without water—make it indispensable in Ladakh's fragile ecosystem. Despite its importance, the population of Bactrian camels has declined over the years due to neglect, increased use of alternatives of modern transport, and limited awareness of their ecological and economic contributions.

Camel Population in Different States of India

India is witnessing a rapid and alarming decline in its camel population, particularly in the traditionally camel-rearing states of Rajasthan and Gujarat. Once a desert icon symbolizing resilience and rural sustenance, the camel is now facing a crisis of survival. The scale and speed of this decline warrant urgent policy attention, as the implications extend far beyond biodiversity loss—posing serious threats to the socio-economic stability of pastoral communities and the ecological sustainability of India's arid and semi-arid regions.

Table 1: Camel population in different states of India (2019)

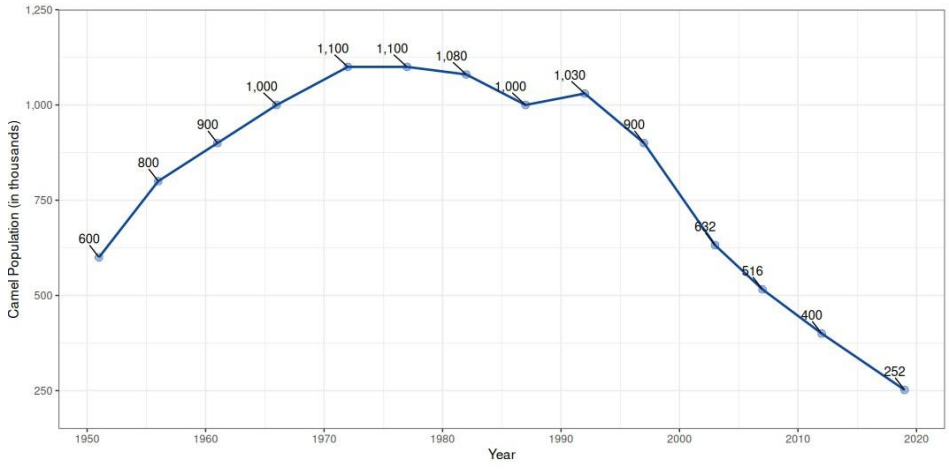
State	Population	Notable Features
Rajasthan	2,12,739	Home to Bikaneri and Jaisalmeri breeds; major source of camels for Pushkar Fair and Border Security Force (BSF) units.
Gujarat	27,620	Known for the Kharai camels, which can swim in coastal regions and feed on mangroves.
Haryana	5,154	Mainly used for agriculture and cart-pulling in semi-arid regions.
Punjab	1,20	Camels are used in agricultural transport and traditional fairs, though their population is in decline.
Madhya Pradesh	1753	Camels here are used for farming and transportation in tribal areas.
Uttar Pradesh	2,424	Used in agriculture and small-scale dairy purposes.
Ladakh	298	Double-humped Bactrian camels found in Nubra Valley, used for tourism and local transport.

Source: Government of India 2019

Population Trends

According to successive Livestock Census data (1951–2019), India's camel population has declined by over 75% in the last three decades across India over a span of nearly 70 years. In 1951, the camel population was approximately 600,000. This number steadily increased in the following decades, reaching around 800,000 in 1961, one million in 1972, and peaking at about 1.1 million in 1977. The population remained relatively stable through the 1980s.

Figure1 : All India camel population (1951-2019)



Source: Government of India, 2019

After 1987, the population trend shows a gradual decline. By 1992, the camel population dropped slightly to 1.03 million, and then to 900,000 by 2001. From this point onward, the decline became more pronounced. The population continued to fall sharply in the 2000s and 2010s.

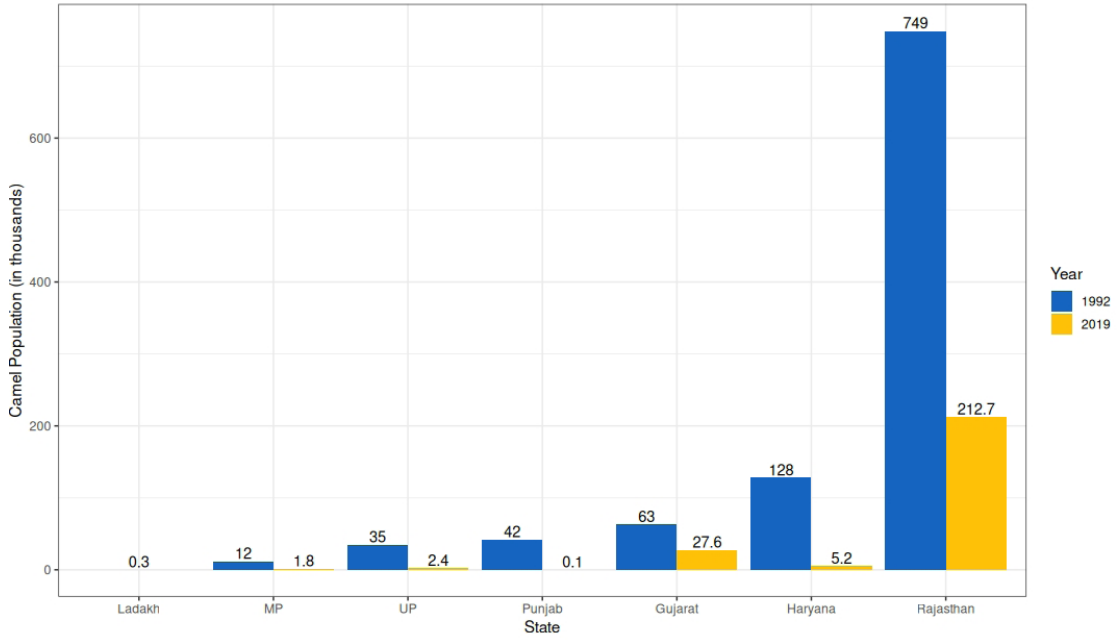
By 2013, the camel population had dropped to around 400,000, and by 2019 it had decreased further to approximately 250,000. Overall, the trend shows a clear and continuous decline in India's camel population after its peak in the 1970s, especially from the year 2001 onwards.

The graph below compares the camel population across six Indian states in two census years: 1992 (in blue) and 2019 (in yellow). In 1992, Rajasthan had by far the highest camel population at 749,000, followed by Haryana with 128,000 and Gujarat with 63,000. Other states also reported moderate numbers: Punjab had 42,000, Uttar Pradesh 35,000, and Madhya Pradesh 12,000.

By 2019, camel populations had declined sharply across all six states. While Rajasthan continued to host the largest number of camels, its population fell to 213,000, marking an approximate 70% reduction. Gujarat, which showed the lowest reduction rate among the six states, saw its camel numbers drop from 63,000 to 28,000, a decline of about 55%.

The remaining states reported zero or negligible camel populations in 2019. Notably, Haryana, which held the second largest population in 1992, experienced a dramatic drop of over 95%, falling to just 5,000 camels. Punjab, Uttar Pradesh, and Madhya Pradesh each saw their populations fall to 2,000 or less, effectively indicating a near-total disappearance of camels in those regions.

Figure 2: Camel population in major states of India



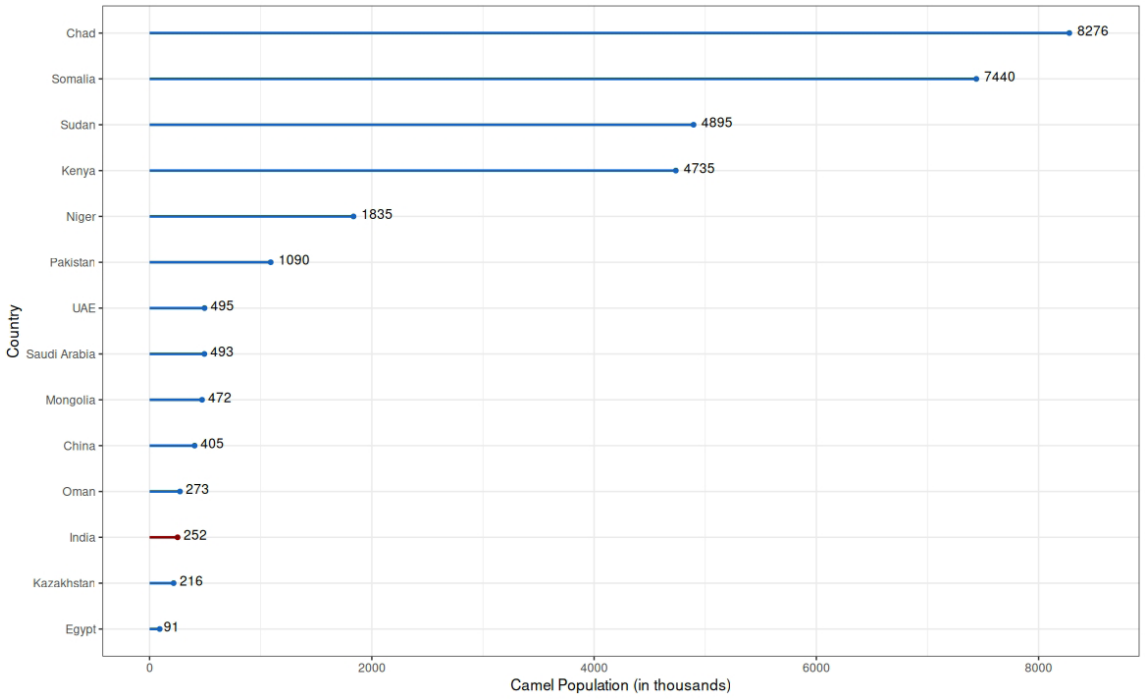
Source: Government of India, 2019

Note on Ladakh: Ladakh is not reflected in the 1992 data, as it was part of the erstwhile state of Jammu & Kashmir. Following the reorganization of Jammu & Kashmir in 2019, Ladakh became a separate Union Territory. As of 2019, Ladakh had an estimated camel population of 298, consisting predominantly of double-humped Bactrian camels found in the high- altitude Nubra Valley.

Global Camel Population Trends

The graph below provides a comparative snapshot of camel populations across ten selected countries for the year 2019. The data highlights the dominance of East African countries in global camel husbandry. Chad leads with an estimated 8.28 million camels, followed closely by Somalia with 7.44 million. These figures reflect the deep-rooted role of camels in the livelihoods and cultures of pastoralist communities in Africa, where camels are vital for transport, milk, and meat in arid and semi-arid environments.

Figure 3: Country wise camel population for the year 2019



Source: FAOSTAT

Sudan and Kenya continue to rank among the world's top camel-rearing countries, with populations of approximately 4.90 million and 4.74 million respectively. These figures reinforce East Africa's central role in global camel pastoralism, where arid landscapes, long-standing herding traditions, and adaptive livestock practices contribute to the resilience of camel-based livelihoods. Niger, with a camel population of 1.84 million, also exemplifies the continued importance of camels across the Sahel, where they serve as critical assets for food security, mobility, and income in drought-prone environments.

Outside of Africa, several countries maintain moderate camel populations supported by diversified uses. The United Arab Emirates and Saudi Arabia each report over 490,000 camels, while Mongolia (472,000) and China (405,000) reflect camel herding traditions in Central and East Asia. These countries are increasingly investing in camel dairies, tourism, and value- added processing, transforming camels into drivers of innovation in niche markets such as camel milk powder, cheese, and personal care products.

By comparison, Kazakhstan and Egypt host smaller camel populations—approximately 216,000 and 91,000, respectively — highlighting the geographic concentration of camel populations in countries where the traditional, non-motorized forms of transport and labor remain more prevalent. This contrast reflects a growing divide: in less industrialized societies, camels continue to serve essential livelihood functions, contributing to their stable or even growing populations. In more economically advanced contexts, including India, modernization, mechanization, and shifting land use patterns have led to a steep decline in camel relevance and numbers. These trends underscore the urgent need for targeted policy reforms, adaptive research, and strategic support to preserve and modernize camel economies, ensuring their continued role in sustainable rural livelihoods and climate adaptation.

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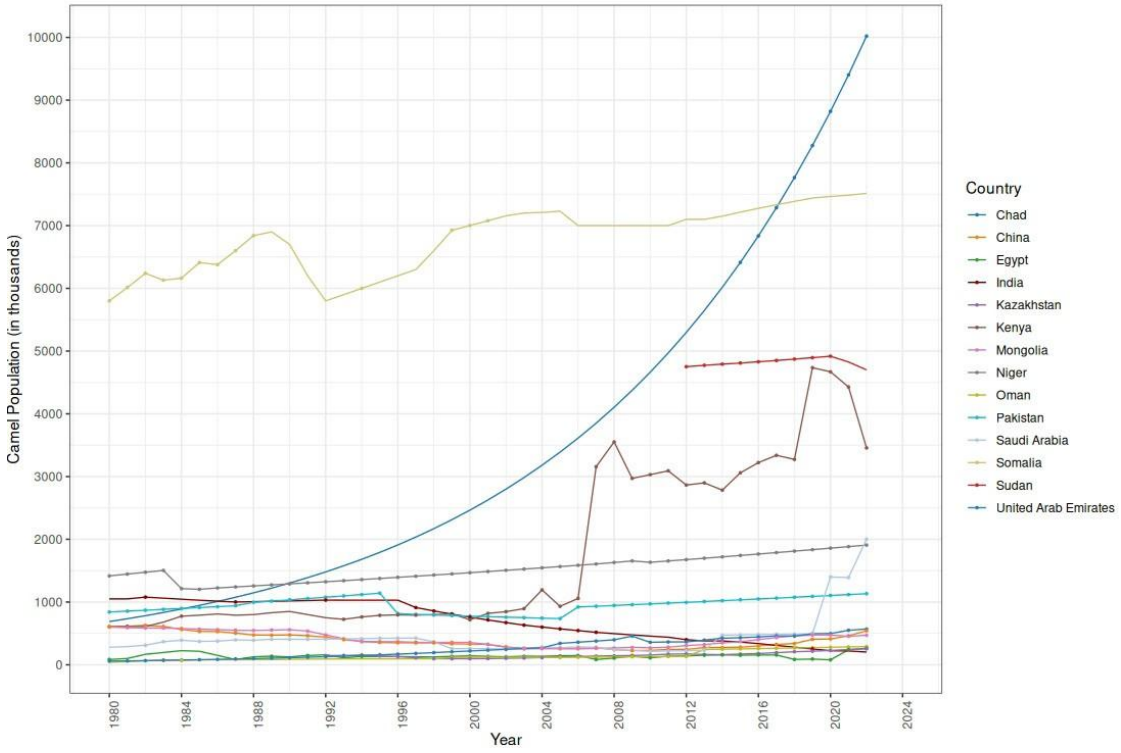
Figure 4: Country wise camel population trends since 1980



Source: FAOSTAT

The graph above displays trends in camel populations (in thousands) across selected countries from 1980 to approximately 2022. A striking trend is observed in Chad,[1] where the camel population has risen dramatically from under 1 million in 1980 to nearly 10 million by 2022. This exponential growth contrasts sharply with most other countries, where camel populations have remained relatively stable or declined.

Kenya, after a rapid increase in the early 2000s—peaking at over 3 million around 2007—has also seen notable fluctuations, with a sharp decline occurring after 2015. In contrast, countries such as Sudan and Somalia have maintained relatively stable camel populations, ranging between 1.5 to 3 million. Meanwhile, countries like China, Kazakhstan, and Mongolia have consistently recorded comparatively low camel populations, remaining under 500,000 throughout the observed period, reflecting differing ecological conditions and levels of reliance on camels for livelihoods.

1 Chad's significant jump is attributed to the completion of a national livestock census in 2014, which provided more accurate data on the country's camel population. Prior to this census, estimates were likely based on outdated or incomplete information, leading to underreporting. The updated figures reflect a more precise count rather than an actual rapid increase in camel numbers. Chad's arid and semi-arid environments are well-suited for camel herding, and the animal plays a crucial role in the livelihoods of many pastoral communities.

Drivers of Decline of Camel Population in India

India's camel population—once central to desert economies, cultural identity, and ecological balance—has witnessed a precipitous decline due to a complex convergence of economic, environmental, legal, and socio-cultural factors. This trend is especially stark in Rajasthan and Gujarat, home to pastoralist communities such as the Raika (Rabari) and Fakirani Jat, who have long served as custodians of camel husbandry. Thirteen interconnected drivers have contributed to the unravelling of this traditional livelihood system:

1. Decline in Traditional Economic Utility

The most fundamental cause of camel decline is the erosion of their traditional economic role. Historically known as the "ships of the desert," camels were once indispensable for transport, agricultural work, and water extraction in India's arid zones. However, rapid modernization has displaced these functions. Tractors and mechanized equipment now perform agricultural tasks; diesel pumps and electric motors have replaced camel-driven water systems; and roads have connected even the remotest villages, making motorized transport faster and more convenient than camel carts or caravans.

By the late 1990s, the market for male camels—once prized as pack animals—had collapsed. Pastoralists recall a time when rearing fine male camels was a source of pride and income. Today, those same animals command little value in local markets.

Another critical shift is the transition toward other livestock. Many pastoralists in Rajasthan and Gujarat have diversified or switched to rearing cows, goats, sheep, or buffaloes, which offer faster returns and greater market demand. Goats and sheep, for instance, reproduce quickly and can be sold more easily for meat than slow-breeding camels. This pragmatic shift has accelerated the decline of camel herding, replacing what was once a culturally prestigious practice with economically driven alternatives.

2. Loss of Grazing Lands and Changing Land Use Pattern

The decline in camel utility has been matched by the loss of land necessary to sustain them. Traditional camel pastoralism depended on access to extensive rangelands, village commons (gochars), and seasonal forest grazing routes. These landscapes have steadily disappeared due to irrigation projects, land privatization, urban expansion, and legal restrictions.

The Indira Gandhi Canal project, for example, transformed large swathes of desert into irrigated croplands, displacing native shrubs and grasses with mustard and cotton fields that camels cannot eat. Fencing and land conversion have rendered once-open pastures inaccessible.

Urbanization has further encroached on scrublands and commons. Expanding villages and infrastructure have permanently altered grazing routes. In protected areas such as the Kumbhalgarh Wildlife Sanctuary, camel access has been banned entirely cutting off traditional monsoon grazing zones for communities like the Raika.

With the fragmentation and closure of grazing areas, camel herders are now forced to purchase fodder or trek longer distances—both of which increase the cost and hardship of camel rearing. In many cases, owners abandon their animals, unable to bear the financial burden, leading to a rise in stray camels across desert districts. Unless grazing access is restored or compensated through designated sanctuaries, the camel population is unlikely to recover.

3. Environmental Stress and Climate Change Impacts

Environmental degradation and changing climate patterns have compounded the challenges faced by camel herders. Desertification, invasive plant species such as *Prosopis juliflora*, erratic rainfall, and prolonged droughts have drastically reduced the availability of native forage. Camels, though well adapted to dry conditions, require a diverse range of shrubs and trees for optimal health. As their natural habitats degrade, herders struggle to find adequate feed, especially during summer and drought periods. In some regions, the destruction of mangroves—vital for the grazing of breeds like the *Kharai* camel in Gujarat—has further threatened camel populations.

In some areas, invasive Prosopis juliflora shrubs have spread, and native fodder trees have been cut down, altering the flora that camels traditionally browse. Unlike cattle, domesticated camels cannot easily be "stall-fed" on common feeds – they require roaming access to diverse shrubs. Overall, the shrinking and changing of camel habitats due to environmental changes has made it increasingly difficult to sustain large herds.

Image 1: Prosopis Juliflora/Neltuma juliflora

Source: ICAR-Central Arid Zone Research Institute

Prosopis Juliflora/Neltuma juliflora : Prosopis Juliflora/ Neltuma juliflora is an invasive thorny shrub native to South America, introduced in India for afforestation and desert control. Over time, it has aggressively spread across arid and semi-arid regions, particularly in Rajasthan and Gujarat, significantly altering native ecosystems. While the both plants are drought-resistant and provide some benefits like fuelwood and erosion control, its rapid growth has displaced native vegetation, reducing the availability of natural fodder for livestock especially camels. Camels, out of necessity, consume their pods and leaves, which can cause digestive issues, dental problems, and metabolic disorders due to its high tannin content. The uncontrolled expansion of Prosopis Juliflora /Neltuma juliflora has degraded traditional grazing lands, caused depletion of groundwater and displacement of native flora, and reduced biodiversity forcing many pastoral communities to abandon camel rearing, contributing to the species' decline. Effective management strategies, including controlled removal and native vegetation restoration, are essential to mitigate its negative impact on camel husbandry and biodiversity (Geoforum, Volume 157, 2024,104144, ISSN 0016-7185).

4. Restrictive legal and Policy Frameworks

Well-intentioned legal measures have often had unintended consequences. The Rajasthan Camel (Prohibition of Slaughter and Regulation of Temporary Migration or Export) Act, 2015, restricted inter-state transport and sale of camels, severely impacting traditional trade routes and the economic viability of camel rearing. Once-thriving camel fairs have declined due to diminished demand and reduced buyer participation. With diminished market access and falling prices, camel breeders—especially those dependent on male camel sales—have seen their incomes plummet.

5. Collapse of Camel-based Tourism and Fairs

Camel-based tourism, including safaris and cultural fairs like Pushkar, once provided an alternative source of income for herders. However, with the reduced availability of healthy camels and shifting tourism trends, these opportunities are diminishing. The COVID-19 pandemic further devastated tourism-related income, forcing many operators to release or sell camels. Today, many traditional camel fairs have pivoted to horse trading or general cultural showcases, sidelining camels entirely and reducing their public visibility.

6. Youth Disengagement and Loss of Traditional Knowledge

With declining profitability and shrinking opportunities, the younger generation of pastoralists is increasingly disengaging from camel husbandry. Many pursue education and migrate to urban areas, abandoning traditional knowledge systems. Elders lament that valuable experiential knowledge—related to camel care, breeding, nutrition, and disease management—is being lost. Without youth involvement, the long-term sustainability of camel rearing remains in jeopardy.

7. Underdeveloped Markets for Camel Milk and Products

While camel milk is recognized for its therapeutic properties, its commercialization remains limited. Infrastructure for collection, processing, and cold chain management is inadequate. Cultural hesitations around camel milk consumption, limited awareness, and the absence of large-scale branding or export readiness hinder growth. Successful pilots, such as Sarhad Dairy in Gujarat, demonstrate potential, but scaling up remains a challenge.

8. Inadequate Veterinary and Animal Health Services

Camels receive disproportionately low attention within public veterinary services. Diseases such as Surra, mange, and foot-and-mouth disease often go untreated due to poor outreach and lack of camel-specific expertise. Disease outbreaks in remote areas can lead to high mortality, especially in young animals. Without systematic disease surveillance and dedicated health programs, camel productivity and survival remain vulnerable.

9. Genetic Erosion and Weak Conservation Effort

India's camel breeds—Bikaneri, Jaisalmeri, Mewari, Kachchhi, and Kharai—possess unique genetic traits suited to diverse agro-climatic zones. However, declining populations and informal breeding practices have led to genetic dilution and localized extinction. Conservation efforts remain underfunded and fragmented. Structured breeding programs, AI technologies, and genomic research are urgently needed to protect these indigenous genetic resources.

10. Marginalization of Camel Herders and Institutional Disempowerment

Camel pastoralists, primarily from marginalized communities, lack access to formal credit, insurance, and producer networks. They are underrepresented in livestock development forums and excluded from most mainstream schemes. Traditional governance structures are weakening, and support from NGOs, though impactful, remains localized. A strong institutional mechanism to empower and organize herders is essential for revitalizing the sector.

11. Decline in Cultural Visibility and Public Awareness

Camels, once celebrated in local festivals, music, and rituals, have seen a decline in their cultural prominence. As their utilitarian roles have diminished, so too has their presence in public consciousness. Media campaigns, educational materials, and tourism programs rarely highlight the camel's significance, leading to a disconnect between younger generations and camel heritage.

12. Withdrawal of Border Security Force Procurement

The Border Security Force (BSF) historically played a major role in sustaining camel populations by procuring them for patrol in desert regions. With the adoption of mechanized vehicles and ATVs, the BSF has significantly reduced its reliance on camels, eliminating a crucial and consistent source of demand. This has had direct economic implications for breeders who traditionally supplied camels for military use.

13. Exclusion of Camel Herders from Development Programs

Unlike cattle, buffalo, poultry, or goat rearers, camel herders have remained on the fringes of livestock development policies. Schemes often fail to consider the semi-nomadic lifestyle of herders, resulting in low program uptake. Institutional barriers, documentation issues, and limited outreach prevent camel pastoralists from benefiting from existing support systems. Without inclusive and tailored programs, camel-based livelihoods will continue to decline.

Policy Analysis and Institutional Response

While the camel economy continues to shrink, policy measures at both central and state levels have largely remained fragmented, reactive, and underfunded. Camels do not receive focused attention under India's mainstream livestock development programs, which typically prioritize cattle, buffaloes, poultry, and small ruminants.

The National Livestock Mission (NLM) includes camels among its supported species, but implementation is limited to scattered support for breeding and small-scale entrepreneurship. There is no dedicated national policy or coordinated mission for camels. Institutional programs lack convergence and fail to address the semi-nomadic, transhumant, and community-governed nature of camel herding.

At the state level, Gujarat and Rajasthan—home to over 90% of India's camel population—have introduced some targeted interventions. These include:

- Calf Birth Incentives and Health Camps in Rajasthan, and
- Support for Camel Milk Processing, Disease Control, and Breeder Associations in Gujarat.

Yet, these efforts often lack continuity, scale, and integration into rural development, public health, or climate adaptation policies. Community voices—especially those of traditional camel breeders like the Raika—remain underrepresented in decision-making forums. The result is a policy vacuum at a time of critical decline.

Key Provisions for Camel Development under National Livestock Mission (NLM)

Under this mission, camels are included as a priority species within the broader agenda of livestock development, with emphasis on:

- Promoting entrepreneurship
- Enhancing breeding infrastructure
- Providing insurance and risk mitigation measures; and
- Supporting product commercialization, especially camel milk, which is increasingly recognized for its nutritional and therapeutic benefits.

Under the Entrepreneurship Development component of the NLM, financial support is extended to promote commercial camel breeding and management. This includes:

- Capital Subsidy: A 50% capital subsidy, up to INR 50 lakh, is available to eligible entities including individual entrepreneurs, Farmer Producer Organizations (FPOs), Self-Help Groups (SHGs), Joint Liability Groups (JLGs), and registered Section 8 companies.

- Support by Scale: The subsidy amount is tailored to the size of the camel breeding unit, as outlined below:
  - » Small-scale units (for pastoral communities): 10 female camels and 1 male – up to INR 3 lakh.
  - » Basic commercial units: 10 female camels and 1 male – up to INR 5 lakh.
  - » Medium-scale units: 50 female camels and 5 males – up to INR 25 lakh; and
  - » Large-scale units: 100 female camels and 10 males – up to INR 50 lakh.

This structured approach allows flexibility for different scales of operations supporting traditional pastoralists at the grassroots level, while also incentivizing organized enterprises to invest in camel husbandry, thereby building a bridge between conservation and commercial viability.

In tandem, state-level initiatives—notably in Rajasthan and Gujarat—have introduced a range of supportive interventions such as:

- Camel conservation and breeding programs
- Financial incentives for camel births
- Veterinary outreach and health care camps
- Research support for genetic improvement
- Promotion of camel fairs; and
- Infrastructure for milk collection and processing.

Breed Conservation, Risk Management and Insurance and Infrastructure Development

The National Livestock Mission supports state governments in conserving indigenous camel breeds, recognizing their significance in rural economies and cultural heritage. To mitigate uncertainties, the NLM provides livestock insurance schemes, offering protection against potential losses due to animal mortality. This initiative ensures that camel owners can safeguard their investments and maintain economic stability. The mission has allocated funds for establishing semen stations and nucleus breeding farms dedicated to camels, aiming to improve breeding practices and genetic quality.

Through these comprehensive measures, the NLM endeavors to bolster camel husbandry, ensuring sustainable development and economic upliftment for communities engaged in camel rearing.

Government Initiatives for Camel Conservation and Development in Rajasthan and Gujarat

Both the Rajasthan and Gujarat governments have implemented initiatives to conserve camels and support the livelihoods of camel herders.

Rajasthan:

a. Camel Conservation Mission: In response to a significant decline in the camel population, the Rajasthan government announced the Camel Conservation Mission and made provisions for budgetary allocation for 2024-25. This initiative includes financial incentives of INR 20,000 to camel herder communities for raising a camel calf, aiming to encourage camel breeding and conservation.

b. Camel Conservation Scheme: Approved in November 2022 with an outlay of INR 2.60 crore, this scheme aimed to protect camels by providing financial support to breeders. Under the scheme, each female camel and her calf are tagged by a veterinary doctor, and the breeder receives INR 5,000 upon tagging and an additional INR 5,000 when the calf reaches one year of age.

c. Ushtra Vikas Yojana: Initiated on October 2, 2016, under the Rashtriya Krishi Vikas Yojana (RKVY), this scheme offered camel farmers a total of INR 10,000 for each calf born, distributed in three instalments. The program aimed to promote camel breeding and ensure the sustainability of the camel population.

Gujarat:

a. Camel Rearing Centre, Dhori (Kutch): Established in 2007-08 under the Department of Animal Husbandry, Gujarat, this camel breeding center focussed on the conservation of the Kachchi camel breed. Under the scheme, camels were managed under a free-range grazing system. The department provided surplus male camels for breeding purposes at a nominal price of INR 2,000 per camel.

b. Disease Prevention Program: A camel disease control scheme has been operational for the past 10 years, targeting diseases such as Surra and Eczema. The program has an annual budget of INR 50 lakh and provides free medical treatment for affected camels.

c. Support for Camel Rearers: In 2009-10, a subsidy of INR 10 lakh was provided for the establishment of "Kutch Unt Uchherak Maldhari Sangathan-Kutch," an association to support camel herder communities and improve their livelihoods.

d. Financial Assistance for Camel Fairs and Exhibitions: In 2015-16, financial assistance of INR 6.09 lakh was granted for organizing a Camel Show in collaboration with Kutch Unt Uchherak Maldhari Sangathan-Kutch to promote awareness and market linkages.

e. Camel Milk Processing and Market Development: India's first Camel Milk Processing Plant was established in Kutch, Gujarat, with an INR 2.61 crore grant under RKVY to SARHAD Dairy in 2016-17 for processing and packaging camel milk. Currently, camel milk is collected from 350 camel rearers, with approximately 5,800 liters of milk being procured daily. The plant produces camel milk, milk powder, ice cream, and chocolates, expanding market opportunities for camel-based dairy products.

f. Proposed Camel Calf Birth Incentive Scheme (2025-26): The Department of Animal Husbandry, Gujarat has proposed a new incentive scheme to promote camel breeding. Under this program, INR 5,000 per calf will be provided as an incentive for camel births. The total allocated budget is INR 1.5 crore, targeting 3,000 camel calves.

Table 2. Comparative Analysis of Camel Policies in Gujarat and Rajasthan

No	Aspect	Gujarat	Rajasthan
1	Policy Framework	No dedicated camel policy but covered under livestock schemes.	Dedicated "Camel Protection and Development Policy" (2016).
2	Legal Protection	Limited legal measures for camels.	Camel declared as State Animal (2014) & protected under Rajasthan Camel (Prohibition of Slaughter and Regulation of Temporary Migration or Export) Act, 2015.
3	Financial Assistance	Limited support through dairy and animal husbandry schemes.	Provides direct subsidies for camel rearers, assistance in breeding, and veterinary care.
4	Breeding and Conservation	Small-scale conservation programs by NGOs and local bodies.	National Research Centre on Camel (NRCC) in Bikaner; breeding farms established.
5	Camel Milk Industry	Supports Camel Milk Cooperatives (Amul 's Sarhad Dairy has established a good network).	Low focus on commercial camel milk production.
6	Use of Camels in Tourism & Economy	Limited efforts in promoting camel-based tourism.	Pushkar Camel Fair, Desert Safari, and Camel Festivals receives state support.
7	Grazing and Migration Policies	Grazing allowed but migration not well-regulated.	Restrictions on inter-state migration under the 2015 Act, affecting camel traders negatively.
8	Community Involvement	Community-based efforts more pronounced for dairy activities	Raika and Rabari pastoral communities involved in conservation efforts but lacks in organized dairy.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Gap Matrix: Challenges and Strategic Interventions

India's **camel-based economy** is at a critical juncture. Once central to rural livelihoods, transport systems, and cultural identity across arid and semi-arid regions, camels have seen a rapid decline in population and utility. This decline is driven by a complex set of interrelated socio-economic, environmental, institutional, and policy factors. The transition to mechanized transport, shrinking grazing lands, restrictive legal frameworks, and limited market development for camel-based products have all contributed to the marginalization of camel husbandry. If these trends are not reversed, India risks losing not only a unique genetic and cultural asset but also a critical climate-resilient livelihood option for dryland communities.

While national programs like the NLM and select state initiatives in Rajasthan and Gujarat offer a foundation for camel conservation and enterprise development, more efforts to be made for the further promotion of this policy. It also should be noted that most policies focus on isolated components—such as breeding incentives or milk processing plants—without addressing the holistic set of constraints faced by pastoral communities. Moreover, camel-specific support is often absent from broader livestock, climate, and nutrition strategies, leaving critical gaps in institutional convergence and long-term sustainability. The following matrix synthesizes the core drivers of camel population decline, highlighting the structural and policy gaps, and recommending actionable solutions to bridge them:

Table 3. Matrix to Identify Gaps and Possible Interventions

No	Driver of Decline	Strategic Gap	Policy Gap	Suggested Intervention	Desired Outcome
1	Decline in Traditional Economic Utility	Obsolete camel roles; reduced income viability	Lack of MSME and value chain support for camel products	Promote camel-based MSMEs, dairy enterprises, and tourism circuits	Diversified and sustainable rural incomes
2	Loss of Grazing Lands	No formal rangeland rights	Absence of legal grazing corridors and forest co-use provisions	Demarcate grazing zones, restore gochars, and promote co-management	Secured forage access for herders
3	Environmental Stress and Climate Change	Shrinking fodder base; degraded habitats	Camels are not prioritized in climate adaptation programs	Integrate camels into land restoration and climate resilience policies	Climate-smart livestock systems
4	Restrictive Legal Frameworks	Collapsed camel trade routes	Over-restrictive state laws on transport and slaughter	Reform the Rajasthan Camel Act, enable traceable, regulated inter-state trade	Legally enabled camel markets
5	Collapse of Tourism and Fairs	Loss of visibility and seasonal employment	No targeted camel tourism promotion	Revive camel fairs, safaris, and state-backed camel tourism branding	Cultural and economic revitalization

No	Driver of Decline	Strategic Gap	Policy Gap	Suggested Intervention	Desired Outcome
6	Youth Disengagement and Loss of Traditional Knowledge	No incentive for youth retention	No youth-targeted skilling or entrepreneurship support	Launch camel youth fellowships, skilling under PMKVY and NRLM	Intergenerational knowledge continuity
7	Underdeveloped Camel milk Markets	Weak value chain and demand	Poor branding and export-readiness	Expand processing, certify camel milk for niche markets, support dairy FPOs	Market-led camel dairy ecosystem
8	Inadequate Veterinary Support	Poor access to camel-specific health services	Camels excluded from mainstream veterinary programs	Create Camel Health Units, including in NADRES, train camel-specialist vets	Improved herd health and productivity
9	Genetic Erosion	Lack of structured breeding programs	Inadequate conservation funding and institutional focus	Pilot AI, genomic selection, and establish nucleus breeding stations	Breed conservation and enhancement
10	Herders' Institutional Disempowerment	Isolated producers; lack of platforms	No dedicated herder institutions or credit access mechanisms	Form FPOs, enable SHGs, and link to financial services under DAY-NRLM	Empowered, organized pastoralist communities
11	Decline in Cultural Visibility	Disconnect from public imagination	Camels not featured in tourism, IEC, or education programs	Launch national camel awareness campaigns and camel-themed rural fairs	Cultural pride and awareness resurgence
12	Loss of BSF Procurement	Disappearance of large-scale institutional demand	No strategy to repurpose camels for modern security operations	Explore multifunctional use in ceremonial/state parades; promote government procurement	Restored public-sector demand
13	Program Exclusion of Camel Herders	No coordinated support system	Fragmented schemes across ministries	Launch a National Camel Development Mission (NCDM)	Centralized, cross-sectoral support system

Strategic Recommendations for Reviving the Camel Economy

To reverse the rapid decline of India's camel population and restore its economic and ecological significance, a multi-dimensional strategy is essential. Based on the identified drivers and policy gaps, the following strategic recommendations are proposed:

1. **Launch the National Camel Sustainability Initiative (NCSI)**

   Initiate a centrally coordinated platform to drive camel sustainability through conservation, rangeland management, veterinary innovation, and livelihood diversification. NCSI should foster cross-sectoral coordination among DAHD, MoEF&CC, Ministry of Rural Development, Ministry of Tourism, and State governments.

2. **Secure Grazing Rights and Restore Rangelands**

   Legally demarcate and restore traditional grazing routes (gochars) and common lands. Promote community-based pasture co-management, reforestation using native fodder species, management of water points for camels and enable controlled access to forest fringes and seasonal forage zones.

3. **Promote Camel-Based Livelihood Diversification**

   Support camel-rearing households through incentives for dairy entrepreneurship, eco-tourism, handicrafts, and logistics. Leverage schemes like NLM, AHIDF, and PMFME to build local value chains.

4. **Expand and Certify Camel Milk Markets**

   Develop structured camel milk procurement networks. Certify camel milk for therapeutic and nutraceutical use, invest in branding, and position it as a premium product for niche domestic and international markets.

5. **Strengthen Camel Health and Veterinary Services**

   Establish dedicated Camel Health Units, train camel-specialist veterinarians, and include camels in national disease surveillance platforms (e.g., NADRES). Support community-led health camps.

6. **Conserve Indigenous Breeds through Genetic Improvement**

   Invest in breed conservation programs through the National Research Centre on Camel (NRCC) and state agencies. Pilot AI, nucleus breeding farms, and genomic research focused on elite traits.

7. **Reinvigorate Camel-Based Tourism and Cultural Fairs**

   Support traditional camel fairs (e.g., Pushkar, Banni) with better infrastructure and marketing. Promote camel safaris and heritage circuits through state tourism departments.

8. **Re-engage Youth through Training and Fellowships**

   Introduce camel-specific skill-building modules under PMKVY and NRLM. Launch Camel Youth Fellowships for community-based conservation, entrepreneurship, and documentation of traditional knowledge.

9. **Empower Pastoralists and Camel Herders through Institutional Development**

   Organize camel herders into cooperatives, FPOs, and SHGs. Ensure their access to formal credit, insurance, and technical extension services through convergence with DAY-NRLM and other rural development programs.

10. **Reform the Legal Barriers and Enable Regulated Trade**

Review and amend the Rajasthan Camel Act to balance conservation with livelihood rights. Facilitate safe, traceable inter-state trade mechanisms supported by transport infrastructure and e-market platforms.

11. Re-establish Institutional Demand through Public Procurement

Reintroduce camels in BSF ceremonial and functional roles. Explore camel use in eco-patrol, desert logistics, and climate outreach missions. Mandate procurement of camel-based goods (milk, leather, dung paper) in government programs.

12. Launch a National Camel Awareness and Education Campaign

Integrate camel themes into school textbooks, public service campaigns, and rural fairs. Celebrate World Camel Day (June 22) with nationwide events showcasing camel culture, conservation, and innovation.


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Expected Outputs Strategic Recommendations:

Table 4: Summary of Recommendations and Expected Outputs

No	Strategic Recommendations	Expected Output
1	Launch the National Camel Sustainability Initiative (NCSI)	Centralized, well-funded national camel support program launched; new rural livelihood options.
2	Secure Grazing Rights and Restore Rangelands	Legally protected grazing areas notified; restored commons and rangelands.
3	Promote Camel-Based Livelihood Diversification	Diversified rural income streams identified and promoted
4	Expand and Certify Camel Milk Markets	Camel milk value chain established; market and export readiness; Uniqueness of camel milk explored and mainstreamed.
5	Strengthen Camel Health and Veterinary Services	Better herd health; improved productivity and disease control.
6	Conserve Indigenous Breeds through Genetic Improvement	Enhanced genetic purity and breed viability.
7	Reinvigorate Camel-Based Tourism and Cultural Fairs	Reinforced camel tourism; Raised public awareness; Strengthened cultural heritage linkages.
8	Re-engage Youth through Training and Fellowships	Job Role on Camel developed under PMKVY and NRLM. Camel Youth Fellowship launched;
9	Empower Herders through Institutional Development	Increased cooperatives, FPOs and Institutional structure for camel herders
10	Reform Legal Barriers and Enable Regulated Trade	Streamlined trade and movement; enabling legal framework; Developed e-market platforms
11	Re-establish Institutional Demand through Public Procurement	Camels in BSF ceremonial and functional roles re-introduced; Stable demand from public systems
12	Launch a National Camel Awareness and Education Campaign	Intergenerational knowledge preserved; youth participation revived.

Table 5: Indicative Potential Key Activities for Each Strategic Recommendation with Timeframe

Strategic Recommendation		Key Activities	Timeframe
1. National Camel Sustainability Initiative (NCSI)	1.1	Design and notify NCSI under DAHD	Short-Term
	1.2	Create Technical Advisory Group	Short-Term
	1.3	Develop MIS for monitoring and delivery	Short-Term
	1.4	Ensure funding convergence (NLM, AHIDF, CSR etc.)	Mid-Term
2. Secure Grazing Rights and Restore Rangelands	2.1	Map traditional grazing corridors and migration routes using GIS tools	Short-Term
	2.2	Conduct carrying capacity study and camel census	Mid-Term
	2.3	Involve District Collectors to formally demarcate gochars and rangelands	Mid-Term
	2.4	Launch state-level pasture regeneration programs with native species	Mid-Term

	2.5	Establish community grazing management committees	Short-Term
3. Promote Camel-Based Livelihood Diversification	3.1	Conduct market research on camel-based products	Short-Term
	3.2	Develop a camel-based MSME support scheme under NLM and AHIDF	Mid-Term
	3.3	Facilitate incubators for camel-product start-ups	Mid-Term
	3.4	Launch camel ecotourism training programs and pilot circuits	Mid-Term
4. Expand and Certify Camel Milk Markets	4.1	Develop camel milk procurement network	Short-Mid-Term
	4.2	Support branding and marketing for camel milk	Mid-Term
	4.3	Include camel milk in nutrition schemes	Mid-Term
	4.4	Facilitate export certification and trade	Long-Term
5. Strengthen Camel Health and Veterinary Services	5.1	Set up mobile camel veterinary units	Short-Term
	5.2	Include camels in disease surveillance systems	Mid-Term
	5.3	Train para-vets in camel-specific health	Mid-Term
	5.4	Provide subsidized vaccinations and treatment kits	Mid-Term
6. Conserve Indigenous Breeds through Genetic Improvement	6.1	Establish and promote nucleus breeding farms	Mid-Term
	6.2	Pilot AI and genomic selection programs	Mid-Term
	6.3	Maintain semen banks and breed registries	Long-Term
	6.4	Launch in-situ conservation with incentives	Mid-Term
7. Reinvigorate Camel-Based Tourism and Cultural Fairs	7.1	Certify Camel Safari Operators and establish guidelines	Mid-Term
	7.2	Develop camel-themed tourism packages	Mid-Term
	7.3	Fund camel-centric fairs, festivals, and exhibitions	Mid-Term
	7.4	Promote camel crafts, textiles, and cuisine	Mid-Term
8. Re-engage Youth through Training and Fellowships	8.1	Launch Camel Youth Fellowships	Mid-Term
	8.2	Document and digitize traditional camel knowledge	Mid-Term
	8.3	Develop Job Role for Camel Husbandry for Skilling as Camel Health Worker	Mid-Term
	8.4	Conduct storytelling and youth competitions	Mid-Term
9. Empower Herders through Institutional Development	9.1	Mobilize herders into SHGs, FPOs and Cooperatives	Mid-Term
	9.2	Provide business and governance training	Mid-Term
	9.3	Facilitate credit, insurance, and entrepreneurship	Mid-Term
	9.4	Institutionalize herder governance models	Long-Term
10. Reform Legal Barriers and Enable Regulated Trade	10.1	Review and amend the Rajasthan Camel Act	Mid-Term
	10.2	Develop national guidelines for traceable interstate transport	Mid-Term
	10.3	Establish Camel Welfare Boards at state level	Mid-Term

	10.4	Develop regulated trade advisory/guidelines for camel products	Mid-Term
11. Re-establish Institutional Demand through Public Procurement	11.1	Reinstate ceremonial use in BSF	Short-Term
	11.2	Pilot camel use in desert tourism and patrol	Mid-Term
	11.3	Include camel goods in procurement policies	Mid-Term
	11.4	Train BSF personnel in camel breeding	Mid-Term
12. Launch a National Camel Awareness and Education Campaign	12.1	Launch IEC campaigns on camel value	Short-Term
	12.2	Integrate camel topics into textbooks	Mid-Term
	12.3	Collaborate with the media for camel promotion	Short-Term
	12.4	Celebrate World Camel Day (22 June) and fairs	Mid-Term

Note: Short-Term: within 1 year; Mid-Term: within 3 years; and Long-Term: within 7 years.

Monitoring and Evaluation of Camel Conservation Strategy

Monitoring & Evaluation Framework

To ensure real-time tracking, adaptive management, and evidence-based decision-making, a comprehensive and multi-tiered **Monitoring & Evaluation (M&E) Framework** is essential for the success of camel milk commercialization and broader camel sector revitalization in India. This framework will enable policymakers to track performance against clear indicators, promptly identify implementation challenges, and make necessary adjustments during the program.

At the core of the national M&E architecture should be the establishment of a **High-Level Camel Task Force** under the Department of Animal Husbandry and Dairying (DAHD). This inter-institutional coordination platform will bring together key stakeholders including government bodies (e.g., FSSAI, ICAR-NRCC, ICMR, CAZRI, NIFTEM, NITI Aayog), international technical partners (such as FAO), State Animal Husbandry Departments, academic institutions, camel milk startups, dairy cooperatives, NGOs, and pastoralist representatives. The Task Force will be responsible for policy alignment, coordination across sectors, approval of action plans, and mid-term strategy reviews.

At the **state and district levels,** particularly in Rajasthan, Gujarat, and Ladakh, local authorities will play a central role in operational monitoring. This includes field-level reporting, community feedback mechanisms, and third-party verification to ensure implementation of fidelity and relevance. Building capacity for veterinary officers, extension agents, and data managers will be key to strengthening M&E at the grassroots level.

Key Monitoring Actions

To support strategic oversight and ensure accountable implementation of camel development initiatives, a robust set of monitoring mechanisms will be put in place at multiple governance levels. To enhance transparency, real-time decision-making, and data-driven governance, a **Camel Sector Dashboard** will be developed. This digital platform will provide interactive, live monitoring of key performance indicators (KPIs) at national, state, and district levels. Metrics to be tracked will include:

- Camel population trends and breed conservation status
- Average milk yield per camel and seasonal production patterns
- Number of camel herders organized into FPOs, SHGs, or cooperatives
- Volume of camel milk collected, processed, and sold
- Infrastructure established (e.g., milk plants, chilling centres, pasteurization units)
- Number of entrepreneurs and startups supported (e.g., via AHIDF)
- Public institutions incorporating camel milk (e.g., schools, hostels, ICDS centres), and
- Research and innovation outputs, including clinical trials and validated health claims.

This national coordination platform may include representation from key institutions such as DAHD, FSSAI, State Animal Husbandry Departments, ICAR-NRCC, and leading academic bodies including ICMR, NIFTEM, and CAZRI. In addition, the Task Force will engage private sector stakeholders—such as camel milk startups and dairy cooperatives—as well as NGOs and pastoralist networks. The primary mandate of this body will be to drive policy convergence, facilitate cross-sectoral coordination, periodically review progress, and steer course corrections as needed throughout the implementation lifecycle.

To complement real-time monitoring, **independent third-party evaluations and impact studies** will be commissioned at key milestones—specifically at the end of Year 2, Year 5, and Year 10. These evaluations will assess:

- **Conservation outcomes** such as population stability and habitat sustainability
- **Economic impacts** including herder incomes, enterprise growth, and market access
- **Nutritional outcomes** in populations reached through public nutrition and health schemes; and
- **Institutional outcomes** such as governance improvements, inter-agency coordination, and program delivery capacity.

Together, these actions will ensure a structured and responsive M&E ecosystem that not only tracks outcomes but also feeds learning back into program design—enabling India to scale a data-informed, inclusive, and high-impact camel milk economy.

Special Section on Camel Milk

Production, Nutritional and Commercial Prospect

Global Camel Milk Output & Leading Producers

Camel milk production worldwide has grown steadily, averaging ~6.5% annual growth since 1961(frontiersin.org). In 2017, global camel milk output was about 2.85 million tonnes, with Somalia (≈953,673 tonnes) and Kenya (≈876,224 tonnes) contributing 64% of the world's production. By recent years, Kenya became the top producer – around 1.16 million tonnes annually (≈26% of global output) – slightly ahead of Somalia at ~0.96 million tonnes. Other major producers include Pakistan (~0.94 million tonnes in 2022) and Mali (~0.27 million tonnes). These top 3–4 countries alone account for most of the camel milk supply. For example, Kenya, Somalia and Pakistan collectively provide roughly 70–75% of the world's camel milk by volume.

Despite a large dairy industry overall, India is a very minor player in camel milk. India's annual production has been on the order of only 5–8 thousand tonnes in recent years – a fraction of a percent of global output. Around 2019, India produced an estimated 6,944 tonnes of camel milk, which was well below 1% of the ~3–4 million tonnes worldwide (i.e. ~0.2% share). This places India roughly around the 10th–12th rank globally (far behind leaders like Kenya or Somalia). Even smaller Gulf producers like the United Arab Emirates produce an order of magnitude more than India –
e.g. UAE's output is ~50–80 thousand tonnes per year India's camel milk contribution is therefore negligible on the world stage, both in rank and percentage share.

India's Production & Global Rank

India's camel milk production has declined over the past decade, in parallel with shrinking camel populations in the country. Official data indicate India produced about 7–8 thousand metric tons per year in the mid-2010s, falling to around 5.9 thousand tonnes by 2023(reportlinker.com). This represents a drop of roughly 25% (around 5% year-on-year decline) in output. Consequently, India's global rank remains low – it does not appear among the top 10 camel milk producers. (For context, the 10th-largest producer, Chad, produces ~35,000 tonnes/year, several times more than India.) India's share of world camel milk output is only ~0.2% (i.e. only a few thousand of the ~3–4 million tons globally). In short, India's camel milk sector is minute compared to global leaders.

The table below summarizes year-wise production volumes (in metric tons) for India and key producing countries over the last 8 years, alongside the world total for context. Kenya and Somalia each produce on the order of ~1 million tonnes of camel milk annually, whereas India's output is only in the single-digit thousands of tonnes. The UAE falls in between – producing a few tens of thousands of tonnes per year. India's production trend has been downward (from ~8k to ~6k), whereas Kenya's climbed sharply (surging around 2019) and Somalia's grew slowly but steadily. The world total has hovered around 3.5–4.3 million tonnes over this period, with an overall upward trend driven by African and Middle Eastern producers.

Table 6: Camel Milk Production of Selected Countries (Unit: Tonnes)

Year	India	Kenya	Somalia	UAE	World
2015	~8,000	7,90,000	9,52,000	54,000	44,20,000
2016	~7,700	8,25,000	9,60,000	57,000	36,40,000
2017	~7,400	8,43,000	9,68,000	80,000	39,00,000
2018	~7,100	8,28,000	9,74,000	75,000	38,30,000
2019	~6,944	11,20,000	9,78,000	74,000	41,80,000
2020	~6,700	11,10,000	9,81,000	85,000	41,40,000
2021	~6,300	10,60,000	9,84,000	78,000	41,80,000
2022	~6,000	11,00,000	9,88,000	79,000	42,50,000

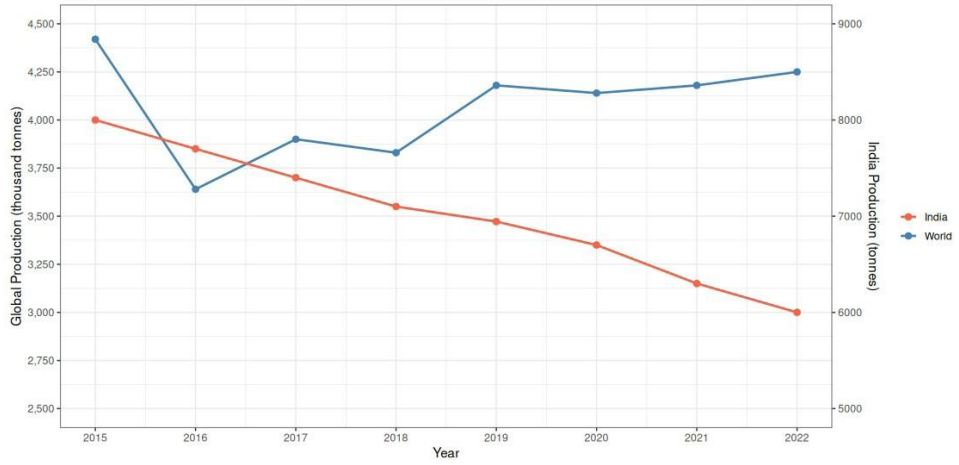
Sources: FAO (FAOSTAT) data; national and industry reports. Figures are rounded.

India's camel milk production is low compared to top global producers like Kenya, Somalia, or the UAE. Kenya and Somalia each yield nearly 100–200 times India's volume, dominating the market. India ranks near the bottom of camel milk- producing nations and contributes well under 1% of the world's supply. While global camel milk output has been rising
(led by African and West Asian countries), India's output has been stagnant or declining, keeping India a marginal player in this niche sector. The data and trends from the past 5–10 years underscore the stark contrast – India's camel milk industry remains nascent and regionally limited, whereas countries like Kenya and Somalia lead the world in harnessing potentials for reviving its population through substantial milk production.

Trends Comparison and Visual Analysis

To better compare India's output with global trends, the figures below illustrate the production trajectories of India versus the leading producers and the world total.

Figure 5: India's camel milk output vs global total production, 2015–2022.



Source: FAO FAOSTAT Database 2022, Government of India 2023, Report Linker (2023)

Note: different y-axis scales – India in actual tonnes (right axis) vs global in thousands of tonnes (left axis). India's production (green line) shows a slight decline, from ~8,000 to ~6,000 tonnes, whereas global output (blue line) remained ~3.8–4.3 million tonnes. India's contribution is so small that it is virtually negligible relative to the world total.

India's line in Figure above is practically flat – its slight downward trend disappearing in the shadow of the massive global production line. The world's total camel milk output (blue line) stayed roughly four to five orders of magnitude higher than India's. In 2022, for instance, India's ~6 thousand tonnes were only 0.14% of the ~4.25 million tonnes produced globally (as illustrated by the gap in the Figure).

Success Stories of Global Camel Milk Market Interventions

A. Somalia: Camel Milk as the Economic Backbone of Nomadic Life

Somalia holds the world's largest camel population, with over 7 million animals, and camels have long served as the backbone of Somali nomadic and pastoral economies. In the absence of mechanized agriculture or formal livestock infrastructure, camels are prized for their milk, meat, transport, and cultural value. During prolonged conflict and climate stress, camels remained a resilient source of sustenance and income.

The resilience of Somalia's **camel-based economy** is largely attributed to the strength of informal, decentralized milk markets, which link rural herders to urban consumers. Camel milk is transported via local supply chains—on foot, donkey carts, and

motorcycles—to cities like Mogadishu, Hargeisa, and Baidoa, where demand remains strong due to nutritional and cultural preference (FAO, 2013).

Local innovations like shade storage tanks, early-morning milking, and natural fermentation have reduced spoilage in the absence of cold chains. Additionally, Somali women have played a critical role in milk collection and trade, often dominating local processing and retail activities (Austriaca, 2020). Several factors explain why camel milk continues to serve as a pillar of resilience and economic stability in Somalia:

- **Informal Market Networks:** Camel milk reaches urban markets through informal supply chains, often managed by women. These networks have proven highly resilient, sustaining consistent supply even amidst political instability.
- **Economic Significance:** For many households in arid regions, camel milk is a vital income source where alternative livelihoods are limited.
- **Climate Adaptation:** Camels' ability to thrive in arid environments and continue producing milk during droughts makes them a cornerstone of food security.

Despite state collapse, Somalia's camel milk economy survived through social capital, flexibility, and indigenous knowledge systems. It continues to be a key contributor to food security, women's livelihoods, and local resilience in the Horn of Africa.

B. Kenya: A mix of Strategic Policy, Women-Led Enterprises, and Food Security

In response to frequent droughts and declining cattle productivity in arid regions, Kenya has strategically promoted camel rearing as part of its national climate adaptation efforts. With a camel population exceeding 4 million, the country now accounts for over 60% of global camel milk production, making it the world's leading producer (FAO, 2019).

To support this shift, the government introduced a National Camel Policy and invested in training programs, veterinary services, and the formation of producer cooperatives. In counties such as Isiolo and Wajir, women-led cooperatives have been instrumental in collecting, chilling, and distributing milk to urban markets.

A notable example is the Anolei Women's Camel Milk Cooperative, which processes thousands of liters daily and supplies milk to Nairobi and other towns (Le Monde, 2024). NGOs such as VSF and SNV have further strengthened the sector by establishing cold chains, solar-powered chilling units, and hygiene protocols. Kenya's camel milk sector is now a model of climate-resilient livestock development through:

- **Policy Support:** The government formally recognizes camels as a key asset for climate resilience, particularly in arid and semi-arid lands.
- **Cooperative Models:** Initiatives like the Anolei Women's Cooperative have improved milk collection, processing, and delivery to growing urban markets.
- **Market Expansion:** Rising demand—driven by camel milk's health benefits and climate adaptability—has spurred new investments and sectoral growth.

Camel milk now contributes to nutritional security, especially during droughts when cow and goat milk supply declines. It also provides economic empowerment to women, enhances rural employment, and strengthens local food systems. Camel rearing has become a core climate adaptation measure in northern Kenya.

C. United Arab Emirates (UAE): From Tradition to Global Camel Dairy Exporter

Despite having a comparatively smaller camel population (~400,000), the UAE has successfully transformed camel milk into a high-value export product through strategic investments in technology, branding, and R&D. Drawing on deep cultural ties to camels, the country has positioned camel dairying as both a preservation of heritage and a modern commercial venture.

State-backed enterprises such as Camelicious (Dubai Camel Dairy) adopted international food safety and quality standards, enabling exports to Europe, the USA, and East Asia. The UAE's approach has been marked by innovation, including:

- Robotic milking systems
- Freeze-drying for powdered camel milk
- Development of chocolates, cheeses, and skincare products
- Veterinary genomics and selective breeding programs

The government has played a pivotal role by establishing export protocols, promoting international branding, and funding scientific research through institutions like the Emirates Industry for Camel Milk & Products (dairyglobal.net, 2023). Key elements of the UAE's camel milk success story include:

- **Modern Dairies:** Facilities such as Camelicious use advanced processing technologies to meet global quality standards.
- **Product Diversification:** A wide range of value-added products—including camel milk chocolates, cheese, and skincare items—caters to health-conscious and niche consumer markets.
- **Global Reach:** Strategic export initiatives have expanded the UAE's footprint in the international market for alternative dairy products.

Camel Dairying is now a premium export industry. Camelicious has become a globally recognized brand, and the UAE has positioned itself as a knowledge hub for camel dairy science and value-added processing.

Key Lessons for India

- **Somalia** shows how **informal networks** and community systems can sustain the **camel-based economy** even under crisis.
- **Kenya** demonstrates the power of **strategic policy, climate adaptation, and gender empowerment** in building a sustainable camel milk sector.
- **UAE** provides a model for high-tech, export-driven camel dairying that combines tradition with innovation.

Nutritional and Health Prospects of Camel Milk

Camel milk, long consumed by pastoral communities in arid regions, has been gaining recognition for its unique nutritional profile and therapeutic potential and has potential to be positioned as a valuable functional food in both domestic and international markets. Scientific research and global market trends increasingly point to camel milk as not just a subsistence product, but a nutraceutical commodity with significant health and commercial value.

Health Benefits and Therapeutic Applications

Camel milk has been recognized for its nutraceutical and therapeutic properties, offering a range of health benefits. Unlike bovine milk, camel milk contains low cholesterol, high vitamin C levels, essential fatty acids, and bioactive peptides, making it suitable for individuals with lactose intolerance, diabetes, and immune disorders (ICMR Nutraceutical Study, 2023).

Research has indicated its potential benefits in:

- **Diabetes Management:** Camel milk contains insulin-like proteins that remain bioactive even after ingestion, helping reduce blood sugar levels and improving insulin sensitivity (Agrawal et al., 2005, *Diabetes Research and Clinical Practice).*
- **Autism Spectrum Disorder (ASD):** Multiple studies have reported improvements in behavioural symptoms among children with autism after consistent camel milk consumption, likely due to its immunomodulatory and antioxidant properties (Al-Ayadhi & Elamin, 2013, *Evidence-Based Complementary and Alternative Medicine).*
- **Gut and Immune Health:** Camel milk contains immunoglobulins, lactoferrin, lysozymes, and antimicrobial peptides that enhance gut microbiota balance, fight infections, and improve gastrointestinal function (FAO, 2011).

These unique bioactive compounds make camel milk an attractive alternative for individuals allergic to cow's milk or those suffering from lactose intolerance, as camel milk lacks ß-lactoglobulin—a major allergen present in bovine milk.

Nutritional Superiority

Camel milk differs from bovine milk in several important ways that contribute to its growing popularity in health-conscious markets.

Table 7: Comparative Nutritional Profile of Camel Milk vs. Cow Milk

Component	Camel Milk	Cow Milk
Vitamin C	3 times higher	Lower
Iron	Higher	Lower
Lactose	Lower (easier digestion)	Higher
Insulin-like Proteins	Present	Absent
Beta-Casein	Like human milk	Different structure

Source: FAO, 2011; Konuspayeva et al., 2007

Camel milk is naturally rich in minerals (iron, zinc, magnesium), unsaturated fatty acids, and bioactive proteins, contributing to its increasing demand as a functional food. Its digestibility, lower cholesterol content, and nutritional density make it especially suitable for infants, the elderly, and immunocompromised individuals.

Commercialization Barriers of Camel Milk in India

Despite its emerging recognition as a nutritionally superior and therapeutically beneficial product, camel milk in India remains a marginal sector, constrained by deep-rooted structural, institutional, and regulatory challenges. The commercialization of camel milk has not kept pace with its potential—owing to a lack of investment in cold chain infrastructure, regulatory ambiguity, fragmented production, and minimal consumer awareness. While Pastoralist Communities in Rajasthan and Gujarat continue to produce camel milk, its limited access to organized markets, processing facilities, and policy incentives has stymied both scale and sustainability. As a result, camel milk remains largely absent from India's mainstream dairy economy, despite its promise as a climate-resilient, high-value niche dairy.

The key barriers to commercialization include:

- **No Scalable Formal Supply Chain:** Unlike cow and buffalo milk—which benefit from robust cooperative networks like AMUL and NDDB—camel milk lacks a structured collection, chilling, and processing ecosystem. Most camel milk is handled by small-scale entrepreneurs or NGOs without the benefit of coordinated logistics. This absence of aggregation infrastructure leads to high spoilage, inconsistent quality, and unreliable volumes—deterring processors, retailers, and exporters alike.

- **Absence of Breeder Cooperatives:** Camel herders remain largely unorganized. Without collective institutions like FPOs or breeder cooperatives, they have limited access to veterinary care, credit, insurance, and structured market linkages. This fragmentation weakens their bargaining power and makes it difficult to implement training programs or establish quality assurance systems. Successful models, such as Kenya's Anolei Camel Milk Cooperative, highlight the importance of organized producer institutions in scaling camel milk value chains.

- **Weak Cold Chain and Processing Infrastructure:** Camel milk is highly perishable, requiring chilling within 1–2 hours post-milking to ensure safety and nutritional integrity. However, there is a near-absence of cold chain systems, pasteurization units, and packaging facilities in camel-rearing regions. The lack of investment in localized processing and storage infrastructure remains a critical bottleneck, limiting shelf life, safety standards, and consumer reach.

- **Limited Consumer Awareness and Market Penetration:** Despite its documented benefits in managing diabetes, autism, and lactose intolerance, camel milk continues to be perceived as a niche or unfamiliar product. Consumer awareness remains low, and the product lacks mainstream retail presence, especially outside camel-producing states. Branding, endorsements, and promotional strategies remain underdeveloped. High retail prices (₹100–₹200 per litre) caused by low production volumes and logistical inefficiencies also restrict affordability for the average consumer. In contrast, other niche products like A2 milk or millet-based foods have benefited from targeted campaigns and government endorsement—camel milk has not.

- **Restricted Access to Retail, E-Commerce, and Export Platforms:** Camel milk is mostly absent from organized retail, e-commerce portals, and public nutrition schemes such as POSHAN Abhiyaan, the mid-day meal program, or ICDS. Although startups such as Aadvik Foods, Raika Milk, and Camel Charisma have tapped into online and direct-to- consumer markets, these remain limited in scale and vulnerable to logistical disruptions. Moreover, camel milk is not included in India's dairy export basket, despite growing global demand for functional and nutraceutical dairy products.

- **Regulatory Gaps (FSSAI Standards for Camel Milk):** One of the most significant barriers is the absence of a dedicated regulatory framework for camel milk. The Food Safety and Standards Authority of India (FSSAI) has yet to publish specific quality standards, labelling requirements, and food safety norms for camel milk and its derivative products. This lack of regulatory clarity restricts licensing, inhibits retail shelf placement, limits public procurement eligibility, and undermines investor confidence. While some pilot approvals exist, the broader sector remains in a grey zone, slowing down innovation and commercialization.

- **Lack of Clinical Validation for Health Claims:** Although camel milk is rich in bioactive peptides, immunoglobulins, and insulin-like proteins, India lacks large-scale, clinically validated studies to substantiate its health claims. The FAO Workshop on Nutraceutical and Therapeutic Properties of Camel Milk (February 2025) underscored this gap, highlighting the need for standardized clinical trials, nutritional profiling, and bioavailability assessments. Regulatory authorities such as ICMR and FSSAI have called for further research to bridge the evidence gap and support therapeutic positioning within regulatory frameworks.

Successful Domestic Models: Signs of Scalable Potential:

Despite systemic challenges listed above, several local initiatives in India have shown promise and offer replicable models:

- **Amul's Camel Milk Launch:**
- In coastal Kutch, Gujarat, the Fakirani Jat community has been central to conserving the unique Kharai camel—a rare breed capable of swimming and grazing in mangrove forests. Under the initiative of Sarhad Dairy (AMUL) with
- support from NGO Sahjeevan, herders began organizing camel milk collection and sale. The Gujarat Cooperative Milk Marketing Federation (Amul) launched camel milk in Gujarat in 2019 as a functional health product. A dedicated camel milk processing plant was established in Bhuj, enabling daily procurement from over 350 herders. This has provided a stable income source for the herders, some of whom have returned from other petty jobs to camel rearing seeing the prospect of stable income through camel milk. The initiative has also raised the profile of Kharai camels nationally and helped secure state support for breed-specific conservation programs.

- **Raika Camel Milk Cooperative (Lokhit Pashu-Palak Sansthan):**

In the face of a sharp decline in camel populations and pastoral incomes in Rajasthan, Lokhit Pashu-Palak Sansthan (LPPS), a Jodhpur-based NGO, which has been working closely on the ground with Rajasthan's camel herders launched a pioneering camel milk initiative to revitalize camel husbandry among the Raika community, traditional camel herder communities. This model focuses on community-owned camel herding in the Pali district of Rajasthan and combines traditional knowledge with pilot-scale milk collection cum chilling units and direct-to-home distribution.

Historically, Raika pastoralists avoided milking camels due to cultural norms. However, with dwindling markets for male camels and restrictive state laws limiting camel trade, LPPS introduced camel milk as an alternative income source that aligned with conservation goals. Through its social enterprise Camel Charisma, LPPS facilitated hygienic milk collection, quality testing, and branding of camel milk products—including raw milk, soaps, and skincare items.

By linking Raika herders directly to niche urban and export markets, LPPS enabled families to earn between ₹18,000–₹30,000 per month, significantly improving household income while incentivizing the upkeep of female camels. The initiative also helped elevate awareness about the nutritional and therapeutic benefits of camel milk, especially for conditions like autism and diabetes.

- **Aadvik Foods (Private Startup):**

Based in Rajasthan, Aadvik pioneered India's first packaged camel milk and powdered milk for e-commerce. It has successfully built a niche customer base focused on health-conscious and special-needs consumers, including parents of autistic children.

These domestic models—although modest in scale—highlight that with the right policy backing, infrastructure support, and market facilitation, camel milk can be transformed from a niche product into a mainstream, climate-resilient dairy alternative.

Repositioning Camel Milk: From Commodity to Therapeutic Niche

At this critical juncture, India must avoid the trap of treating camel milk as a low-cost commodity competing with mainstream bovine dairy. Given the relatively small and declining camel population and the high cost of production, India cannot pursue a volume-based strategy. Instead, a value-based strategy is essential—one that leverages the unique health and therapeutic properties of camel milk to create a premium niche market.

Camel milk should be positioned not merely as milk, but as a functional food or nutraceutical product that delivers specific health benefits—particularly for consumers with diabetes, lactose intolerance, or certain autoimmune or neurodevelopmental conditions. Such positioning would justify higher price points for producers, improve livelihoods for camel herders, and ensure economic sustainability even with modest production volumes. Branding camel milk for its therapeutic applications would also align with emerging trends in global nutrition, wellness, and alternative dairy markets.

To realize this shift, India must focus on:

- Establishing scientific validation and regulatory recognition of camel milk's nutraceutical properties
- Supporting camel herders through value chain integration and price premiums
- Developing product lines that align with consumer health needs (e.g., camel milk for autism, diabetes, gut health), and
- Investing in awareness campaigns and targeted retail strategies that highlight the "desert health elixir" identity of camel milk.

This reframing—from a fragile rural product to a high-value, health-linked dairy alternative—represents a strategic inflection point. It also offers a pathway where conservation and commerce can reinforce one another: the more valuable camel milk becomes in the eyes of consumers, the stronger the incentive for pastoralists to maintain and expand their herds.

Recommendations for unlocking the potential of Camel Milk Commercialization

To address the systemic barriers and realize the full economic, nutritional, and ecological potential of camel milk in India, the following strategic interventions are proposed:

1. **Establish a National Research Consortium for Clinical Validation**

   A multi-institutional research platform should be established—bringing together entities such as Indian Council for Medical Research, ICAR-National Research Center for Camel , Food and Standard Authority academic institutions, and regulatory authorities—to conduct standardized clinical trials. This initiative would support bioavailability studies, therapeutic efficacy validation, and nutritional profiling, enabling evidence-based policy support and regulatory recognition for camel milk and its derivative products.

2. **Undertake Region-Specific Studies on Milk Composition and Variability**

   Seasonal shifts, feed types, and environmental conditions significantly influence camel milk composition. Targeted research should be conducted to capture and understand this variability, informing appropriate quality standards, pricing mechanisms, labelling norms, and product development strategies tailored to regional contexts.

3. **Reposition Camel Milk as a Nutraceutical Product**

   Camel milk should be promoted not as a conventional dairy product, but as a high-value nutraceutical supplement. Its proven benefits for individuals with diabetes, lactose intolerance, and autism spectrum disorders justify this positioning.

Reframing camel milk in this way will support premium pricing, drive demand from health-conscious consumers, and open new market segments.

4. Integrate Camel Milk into Public Nutrition and Health Schemes

Camel milk can be systematically included in national nutrition and health missions as well as hospital trials. Its unique nutritional profile, digestibility, and therapeutic benefits make it a suitable intervention for undernourished and health- sensitive populations. Furthermore, camel milk can be promoted for therapeutic use in Ayushman Bharat Wellness Centers, particularly targeting children with autism, individuals with diabetes, and those with lactose intolerance, subject to regulatory validation.

5. Set Up Camel Milk Procurement and Processing Hubs

To enable effective aggregation and value addition, regional camel milk procurement and processing hubs should be established in key camel-rearing clusters such as Bikaner, Jaisalmer, Barmer, and Kachchh. These hubs should include chilling centres, pasteurization units, and facilities for producing milk powder, chocolate, and other value-added products, supported under schemes such as AHIDF. Existing dairy cooperatives such as Amul and Saras can be leveraged for procurement and distribution, or new camel milk cooperatives may be formed where necessary. In parallel, startups and FPOs engaged in camel milk processing should be incentivized through targeted financial and technical support.

6. Implement a Four-Pillar Strategy for Sector Development

The camel milk value chain should be developed through a four-pronged approach:

- Conservation of camel breeds and genetic resources
- Aggregation via support for camel breeder institutions, cooperatives, and FPOs
- Commercialization through investment in infrastructure, branding, and entrepreneurship; and
- Scientific Validation to underpin health claims and guide product positioning

This integrated strategy would enable camel milk to emerge as a sustainable, climate-resilient solution for rural livelihoods, nutritional security, and biodiversity conservation.

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