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CAMEL VALUE CHAIN

Business Landscaping Report

A brief overview of the Camel Milk Value Chain
across the Globe and in India

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Abstract:
A brief overview of the Camel Milk Value Chain across the Globe and in India

Research Concept, Coordination & Report Writing:
Ameya Kolhatkar (*pgp19.ameya@spjimr.org*)
Sagar Moondra (*pgp19.sagar@spjimr.org*)

Technical Inputs:
Nityanand Rai,
Aastha Maggu, and
Tatsama Motilal

Images:
DRC Team, URMUL Archives

Designing:
Lok Priya

Strategic Inputs and Overall Guidance:
Anshul Ojha

Secretariat at:
Urmul Trust, Bikaner
Email: *tcp.urmul.org*

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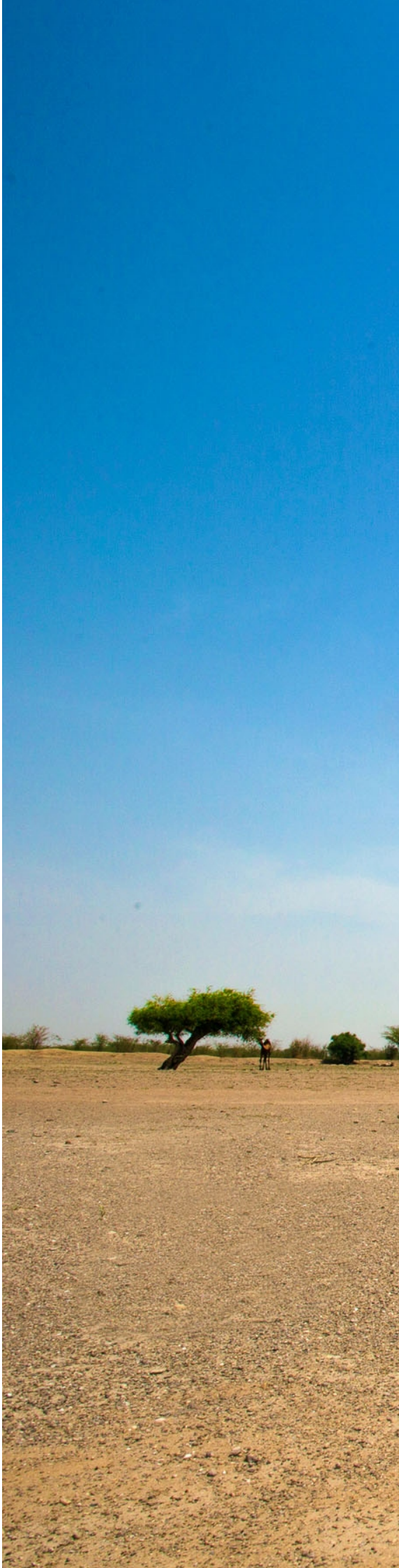


Preface

Through this report, we, Ameya Kolhatkar and Sagar Moondra wish to document our study and analysis of the camel value chain in India and globally – along with the opportunities it offers and the challenges it poses. The report has been created by the means of extensive secondary research conducted via material available online and in research publications and aims to serve as a repository of information on the camel milk value chain.

We have explored multiple facets of the value chain – covering the overall industry scenario, global trends in camel population and camel milk supply, the corresponding trend in India, major market players – Global as well as Indian, the various forms of value-added products made from camel milk, the unique benefits offered, and some key challenges in the value chain. Finally, recommendations on how to effectively enter and thrive in the business have been offered based on our research.

We hope that the reader of this report can acquire a fair sense of the present scenario of the camel milk value chain in the country and abroad, and is made aware of the opportunities that exist – and the market potential of the business.

Acknowledgment

We would like to extend our thanks to all the stakeholders who've assisted us in various ways to complete this project report. First, we would like to thank the entire team of the Desert Resource Centre and its head Mr. Anshul Ojha, who provided us an opportunity to work with rural NGOs and for his invaluable inputs and guidance throughout the project.

We would also like to express our gratitude to Mr. Nityanand Rai, Ms. Aastha Maggu, and Ms. Tatsama Motilal for providing constant support and assistance throughout the project. Through the resources they shared, we were able to deepen our understanding of the value chain and synthesize the information available on online sources and journals more effectively.

Executive Summary

The trend in Indian population over the last decade has been the converse of the global trend – while the Indian camel population saw a 37% decline between 2012 (~4 Million) and 2019 (~2.5 Million), globally, the camel population increased by ~17% in roughly the same period (36 Million in 2018). The global growth is largely fuelled by the increasing demand for camel milk, especially in the USA, Africa, and the Gulf, brought about by the increasing awareness of the unique benefits of camel milk. Currently valued at US$ 5.98bn, the market size is expected to expand at a 10% CAGR over till 2027.

Camel milk has higher perishability as compared to milk from other cattle species, which makes non-pasture procurement of the product difficult. The finished product too has a lower shelf life unless pasteurized. It is sold in many forms – including pasteurized milk, frozen raw milk, flavored milk, milk powder, dessert items like chocolates and ice creams, and a range of skincare products.

Globally, African countries are the major producers of camel milk, with Somalia, Kenya, and Mali being the leaders in production. In the developed countries, companies like Camelicious (UAE), Desert Farms (USA), and QCamel (Australia) have been growing consistently year on year for the last decade. Typically, these companies own the camels they milk and herd them in enclosures. They serve their home and neighborhood markets with products like raw and pasteurized camel milk, powdered camel milk, chocolates and desserts, and a range of skincare products.

In India, Aadvik Foods was the first major commercial player to enter the business in 2016. Today it has an annual turnover of over INR 4 crores and deals majorly in freeze-dried powder variants, chocolates, and skin products. National player Amul entered the business in 2018 with camel milk chocolates and has expanded into bottled pasteurized camel milk since 2019. While Aadvik Foods has limited physical coverage, it is present on all e-commerce channels, whereas Amul has expanded its camel milk coverage to all major metros in India. Both the firms base their value proposition on the multitude of health benefits offered by camel milk. Camel Charisma too is a limited capacity operator that aims to preserve the traditional way of living of the indigenous camel herding Raika community.

The industry faces multiple challenges – ranging from unstable demand, inconsistent supply, declining camel population, low yield per camel, anda shorter lactating period to high perishability of the product. These factors

lead to camels being priced up to 6-10 times higher than that of other cattle species. However, the biggest challenge in the category is the lack of awareness about the product and its benefits outside special groups like diabetes, lactose intolerance, and autism patients. Apprehensions about the taste and smell of the milk from a relatively-unknown species also exacerbate the problem.

Research Methodology

The methodology and the approach applied for steering the research project was a combination of both primary as well as secondary research, including examining numerous high-quality research reports on camel milk and the United Nation's Food and Agricultural Organisation website for the key statistics related to world camel population and camel milk production. We also leveraged the valuable reports as maintained by the DRC team to obtain key insights regarding the industry. Apart from this, we also kept up to date with the news encompassing the camel milkin India as well as across the Globe.

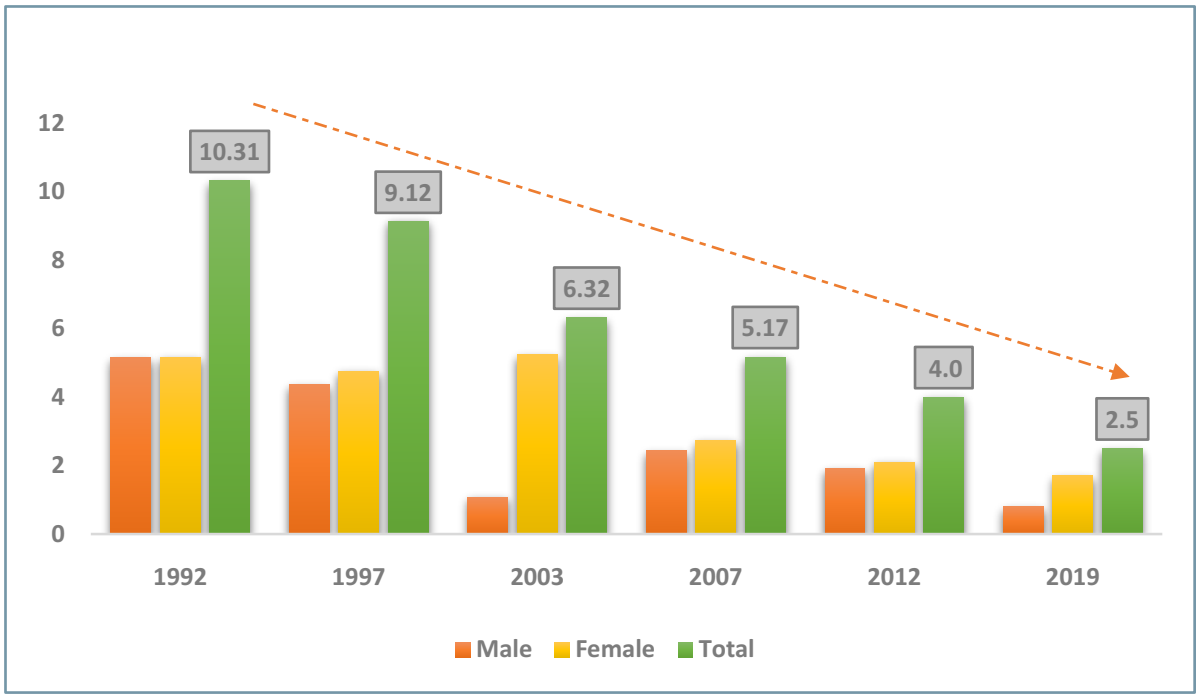
Beyond the literature review, we spoke to Mr. Sumer Singh Bhat, a local camel herder; Mr. Santosh, a Chennai based camel milk entrepreneur; Mr. Nilesh Jankar, the plant head of Sarhad Dairy that produces camel milk products for Amul; Mr. Hitesh Rathi, founder of Aadvik Foods; Mr. Hanwant Singh, co-founder of Camel Charisma; and a few end customers to get some valuable insights about their perception regarding the camel milk. Apart from this, we also attended a webinar on Camel Milk organized by Ilse Köhler-Rollefson – the co-founder of Camel Charisma to obtain some deeper insights regarding the plight of the herders.

Introduction

Camelus dromedarius or Camelus bactrianus, more commonly known as single-humped and double-humped camel respectively, are found in abundance in the Thar desert in India – majorly in the Kutch region and western Rajasthan and Nubra Valley in Ladakh, respectively. The 4 most common breeds in India are – Bikaneri, Jaisalmeri, Mewari, and Kachchhi (Kharai) breed. The Bikaneri and Jaisalmeri breeds are found in the desert regions, whereas the Mewari breedis usually found in the hills and the Kachchhi breed is found in the Kutch region.

World Camel Day is celebrated on 22nd June every year. It was for the first time that on the occasion of World Milk Day on 1st June'20, the camel milk consumers, producers, and experts from across 35 countries raised a virtual glass of camel milk. The camels have been a valuable source of livelihood for generations in the Desert regions. The Raika community in western Rajasthan has thrived their livelihood through camels for generations now but have always been against selling the milk of the mighty animal as they believe it to contain incredible powers. The camel milk has helped them survive a year-

Total Camel Population in India (in lakhs)

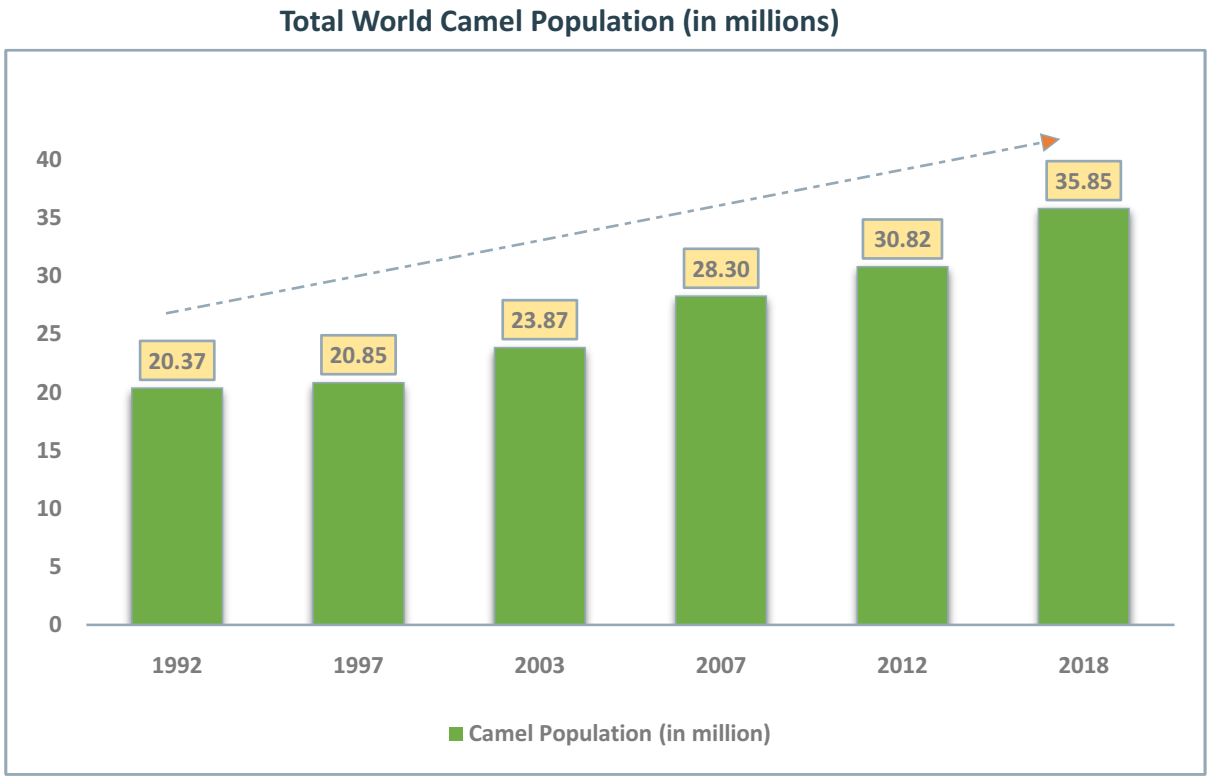


long famine. The community has been reluctant to commercialize its milk as they believe it to be of religious and cultural significance.

However, due to urbanization, better-earning opportunities in metro cities, and technological advancements, we've observed a significant decline in the utility of camels for transportation and other purposes.At the same time, the cost of feeding the camel has also surged owing to inflation and decline in the grazing pastureand, the cost of breeding has also risen. Also, the incompetent veterinary system with infrequent medical camps by the government has resulted in poor health of the camels.

Hence, it has become financially unviable for the camel herders to retain their camels, as the costs outweigh the financial benefits and many herders have simply let them free because of their unaffordability. As a result, the camel population has declined from 10.31 lakhs in 1992, to almost 2.5 lakhs in 2019.

However, in the same period, the world population of camels has risen from 19.92 million in 1992 to almost 35.52 million in 2018, resulting in a cumulative annual growth rate (CAGR) of 2.75% in the last 15 years. According to FAO, camels have been the 2nd quickest rising herbivores livestock in the world over the last 50 years, after buffalo.



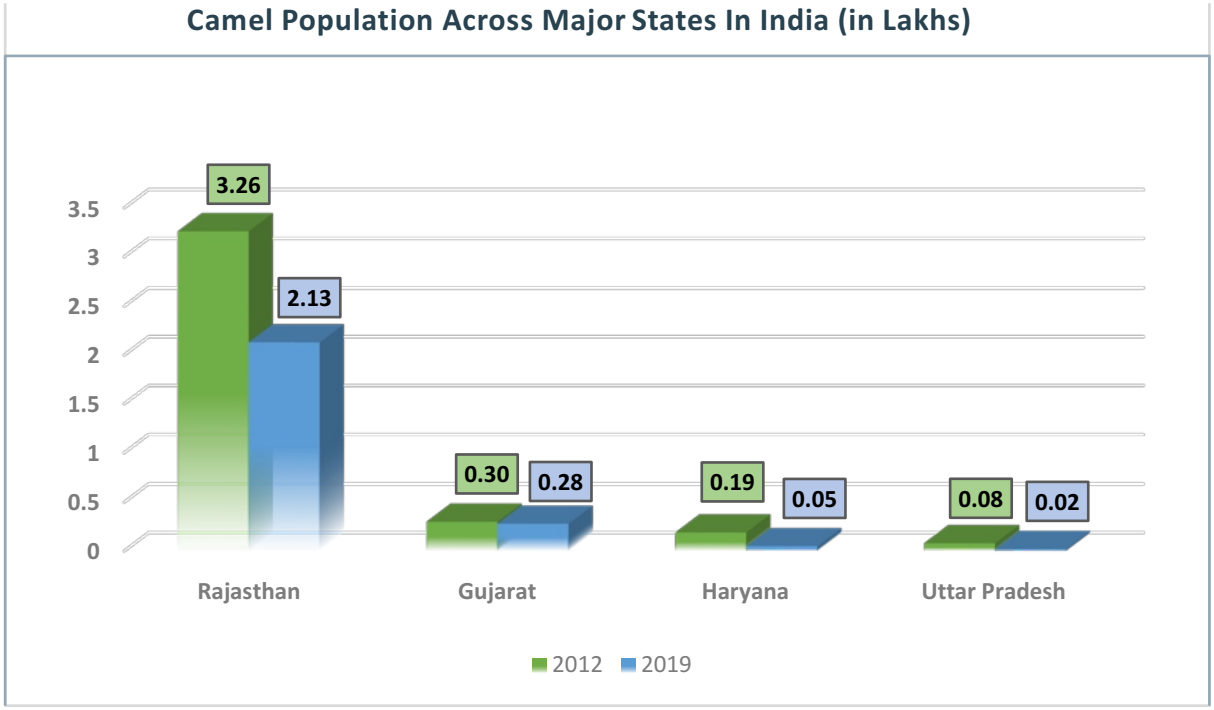
Source: Food & Agriculture Organisation of the United Nations[14]

Recently, Australia announced the culling of over 10,000 camels in 2020 since the drought brought the camels closer to the remote towns in search of food and water and destroying the infrastructure along their way.

The distribution of camels in India is mainly concentrated in the western Rajasthan and Gujarat regions, with a few numbers in

Haryana and Uttar Pradesh as well. The number of camels in Rajasthan has declined significantly, whereas the population of camels in Gujarat has been relatively stable.

To study the various potential socio-economic benefits from the camels, a National Research Centre on Camels was set up in Bikaner in 1995. The research center was established to conduct further studies on camel value chain and the potential of the camel milk value chain. Apart from the institute, the country has seen various NGOs raising awareness about the preservation and potential socio-economic benefits of the camel milk in the region.



Source: Government Livestock Census[06]

With the world realizing the nutritious and therapeutic benefits of consuming camel milk, the economic significance of the mighty animal would soon be on the rise. Camel milk has proved to be a much healthier alternative to widely available bovine milk. Having high levels of vitamin C, protein, iron, and lower fat than the cow and buffalo milk, it proves to be a valuable choice for people suffering from ailments such as diabetes, autism, blood pressure, and heart diseases.

Also, the rising climate temperatures across the globe, and especially in the hot regions, increase the importance of camels all the more like no other milk-producing herbivore would be able to survive the rising temperatures and produce milk.

As a result, India has witnessed various start-ups setting up camel milk dairies across the camel herding regions in Gujarat and Rajasthan, with demand rising not only from India but even across the world. The brands have also started offering various other milk-based products such as soaps, body lotions, and flavored powdered milk.

Insights from Primary Interviews

Hanwant Singh,
Co-founder - LPPS

Mr. Hanwant Singh, along with Dr. Ilse Koehler is the co-founder of LPPS (Lokhit Pashu-Palak Sansthan), an NGO aimed at camel and camel community conservation. It aims at providing alternative sources of income to camel herders of the Raika community and collects, produces, and distributes camel products like camel milk, camel cheese, camel wool, camel milk soaps, and camel dung paper. The NGO collects and processes 40-50 litersof camel milk every day - merely a fraction of the possible 20,000L that can be collected via the network of camel herders that the NGO deals with. Mr. Singh attributes the small scale of the camel milk business in the industry to a lack of awareness about the benefits of the product among a wider audience.

Efforts to commercialize camel milk production were initiated in an attempt to make camel rearing viable again, a profession that faced obsolescence in the intra-desert transport utility after the advent of mechanized transport and national and state highways. Presently, most of the camel milk produced in the ecosystem is consumed internally among camel offspring or herder families - adding no additional income to the herders, making camel husbandry an unviable occupation. This, according to Mr. Singh, has been the primary reason for the decline in the camel population in the state - a phenomenon that his NGO is trying to stem.

Mr. Santosh,
Entrepreneur, Chennai

Based out of Chennai, Mr. Santosh has been trying to generate demand for camel milk among special users in metro cities of southern India. However, the lack of awareness about the nutritional benefits and the unfamiliarity with camels in southern regions has been a challenge. Also, by one of his accounts, parents of autistic children are apprehensive about the actual benefits offered by the product despite its much-touted potency - a mother who is an influencer in such circles tried camel milk powder from Camelicious (from UAE) as a solution to check autism in her son, but with unsatisfactory results. This is further compounded by supply chain issues in moving large quantities of camel milk from production centers in Rajasthan to the south.

Mr. Santosh has been activating the market - especially in the diabetics' segment by creating

awareness among doctors specializing in Diabetes care about the health benefits offered by camel milk, i.e. the natural insulin-like compounds present in the product.

Hitesh Rathi,

Aadvik Foods

Hitesh Rathi is the CEO and founder of Aadvik Foods, the first major Indian player in the camel milk value chain. Established in 2016 with exclusively camel milk products, the firm has reached an annual turnover of INR 4 crores and now deals in cow and goat milk products as well.

In its four years of operations, Mr. Rathi has been able to standardize the processes and the cold chain distribution of camel milk products. The particularly challenging product after the inception of the company was raw camel milk, which has to be frozen at the place of production and delivered hundreds of kilometers away at the place of consumption, still in frozen form.

Mr. Rathi emphasizes the need to increase awareness about the abundant health benefits of camel milk in the general population for the segment to grow. Presently, awareness remains limited to special users like diabetics and patients with autism. The high price of camel milk compared to milk from other cattle species further inhibits trials and adoption by the general population.

The story of an Entrepreneur –

Sumer Singh Bhati

Mr. Sumer Singh Bhati is a camel pastoralist and a camel conservationist based out of Samvat village in Jaisalmer District, home to the largest camel population in India. He started a camel milk collection and processing enterprise in 2017 after undergoing intensive training from the NRCC (National Research Centre on Camels) and owns a herd of over 400 camels. Currently, he has the potential to procure up to 2,000 liters of camel milk a day, a number that is grossly underutilized due to low demand for camel milk – just over 100 liters are sold daily. The rest is consumed by young camels in his herd.

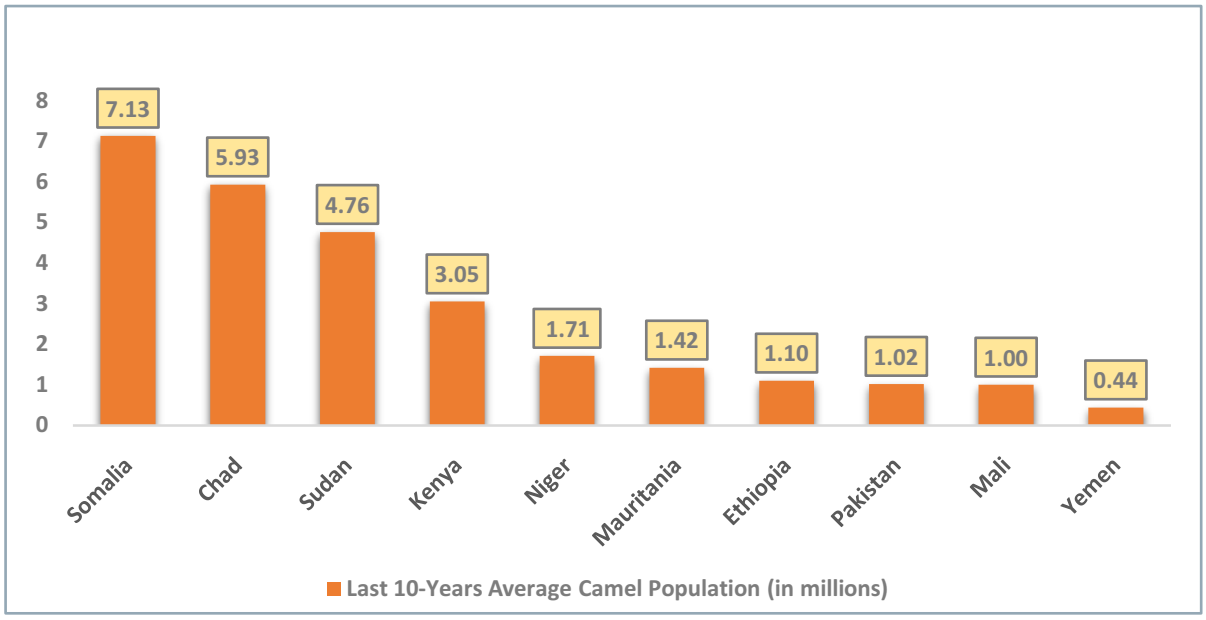
Mr. Bhati has successfully set a small-scale camel milk dairy in Jaisalmer that caters to the local and tourist populations. His principal products are lightly treated camel milk – priced at INR 100 per liter and camel milk ice-cream – priced at INR 40 a scoop. Apart from the local orders, orders in metros like Jaipur and Mumbai are also catered to, using iceboxes and intrastate/interstate bus services to transport the milk in a frozen state.

Outside his dairy enterprise, Mr. Bhati also runs Deghrai Oonth Sharakshan – a camel conservation NGO with a network of over 30 thousand camels in Jaisalmer district. The NGO organizes camel herders and enables camel vaccination drives in collaboration with government initiatives and other NGOs. In light of the high herding and vaccination costs (at least INR 1,500 a year on vaccination per camel), the NGO aims at arresting the fall in camel population in the region and find alternate ways to sustain the herders' traditional practices.

Industry Overview

The global market size of camel milk was approx. US$ 5.98 bn in 20190, which is dominated by the Middle East and Africa with approx. 60% share of the global revenue. Somalia, Kenya, Mali, Ethiopia, Saudi Arabia, and Niger are the major producers of camel milk in the world, with Somalia and Kenya responsible for more than 60% of the production. In terms of consumption, Saudi Arabia leads the list with per capita consumption of approx. 33 liters per annum

Top 10 Nations with Highest Camel Population (in millions)

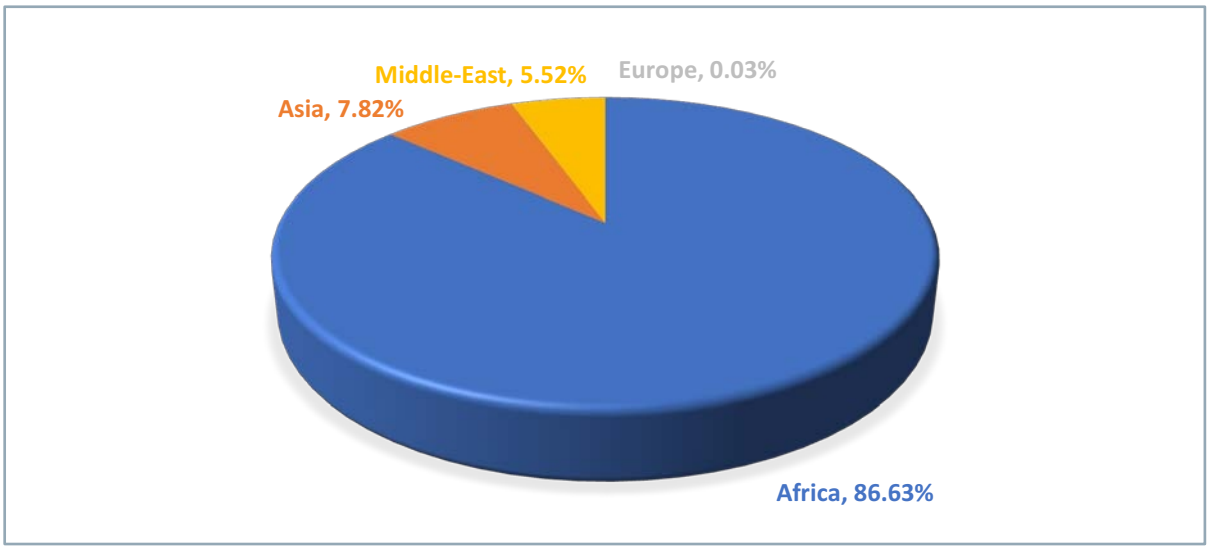


Source: Food & Agriculture Organisation of the United Nations[14]

Due to the therapeutic values of camel milk, many diabetic consumers in the United States of America and Canada have started shifting towards consuming camel milk on account of its higher insulin content, thus tipping North America to experience the fastest growth in terms of consumption. The leading company in the camel milk segment in terms of revenue is Desert Farms, a US-based company. Emerging markets such as the USA, India, China, and Russia are projected to broaden their scope of producers in the coming years.

According to Dr. Bernard Faye, a veterinarian and chair of the International Society of Camelid Research and Development, the global camel market is estimated to grow at more than 10% in the next decade, thus resulting in more supply of camel milk and growth of this sector.

10 - Years Average Camel Population By Region

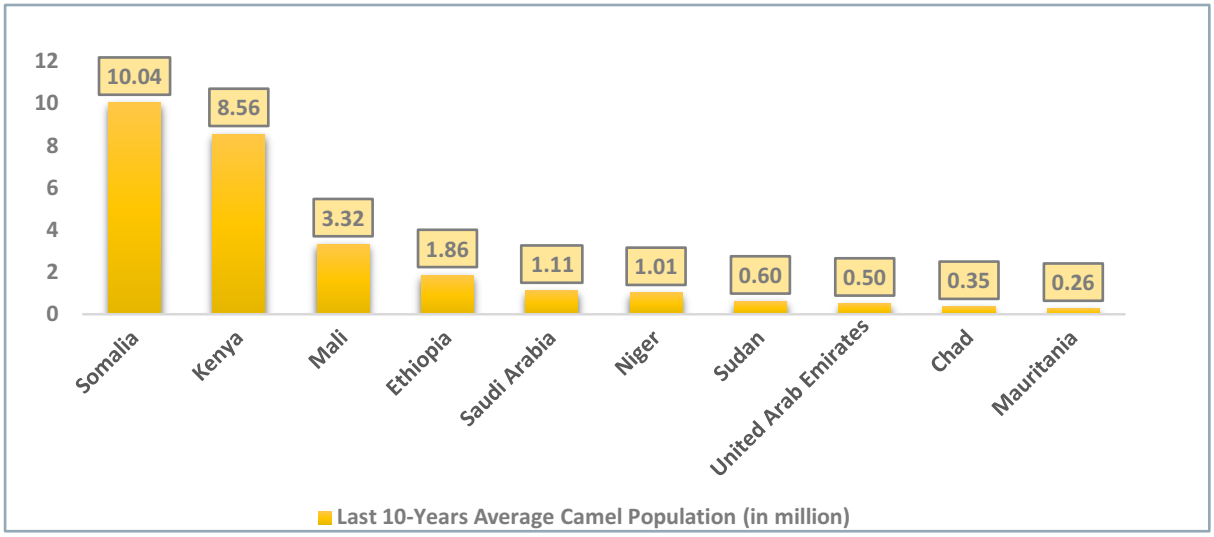


Source: Food & Agriculture Organisation of the United Nations[14]

Major Players - Global

Global average of the camel milk production for the last 10 years is approx. 30lakh tonnes. The top 6 camel milk producing countries in the world constitute approx. 90% of the total camel milk produced.

Top 10 Camel Milk Producing Nations (in lakh tonnes)



Source: Food & Agriculture Organisation of the United Nations[14]

Coordinates for the Major Market Players – Global as well as Indian

Sr. No.	Company	Website	Country	Contact No.	Email ID
1	Camelicious	www.camelicious.ae	UAE	+971 - 4 -2281034	info@camelicious.ae
2	Desert Farms	desertfarms.com	USA	+1 (800) 430 - 7426	support@desertfarms.com
3	QCamel	www.qcamel.com.au/	Australia	+61 - 7 - 5438 7890	
4	Aadvik Foods	www.aadvikfoods.com	India	+91-8800638181	info@aadvikfoods.com
5	Amul	www.amul.com/products/camel-	India	+91 2692 258506	gcmmf@amul

A brief overview of the major market players, Global as well as Indian:

Company	Country	Products	Collection Network / Volumes	Value Proposition
Camelicious	UAE	Camelmilk, Ice-creams, Flavored camel milk, Lifestyle Drinks, Ghee, Milk Powder	~1,300Milchcamels; 11,000liters per day	Camel milk products for daily consumption
Desert farms	USA	Raw camel milk, Pasteurized milk, Milk powder, Camel Fat, Kefir, Skin-care products	5,000 camels	The higher nutrient value of camel milk compared to cow milk; uses for lactose intolerance and autism
Q Camel	Australia	Pasteurized milk, Camel milk powder, Yogurt, Smoothies, Feta cheese, Chocolates, Skin creams, Facemasks, Handwashes, Soaps	110 camels	Health benefits like nutrients, healing properties, and an alternative for lactose intolerance; organic camel rearing, ethical treatment of its cattle
Aadvik Foods	India	Camel milk powder, Frozen camel milk, Camel milk chocolates, Camel milk soaps, Body cream' and Moisturizers	~200 camel herders; ~1,000 liters per day	Health benefits - in the areas of autism, diabetes, immunity building and lactose intolerance, natural goodness of camel milk
Amul	India	Camel milk, Chocolates, Camel milk powder, Camel milk ice-creams	~450 camel herders,~1,300 liters per day	Natural insulin like proteins which help control sugar levels in diabetic consumers
Camel Charisma	India	Raw Camel milk, Camel milk cheese	~50 liters per day	Activist/conservationist enterprise striving to keep camel husbandry feasible for the Raika community

Camelicious, UAE

Based out of Dubai, Camelicious is one of the largest camel milk product companies in the middle east regionstarted with a vision to run and maintain a creative & sustainable camel farm. Started in 2006 with 625 company-owned camels, it owned more than 8000 camels (with ~1300 milch camels) in 2019, and employed almost 550 employees. It uses a self-owned farm business model with a farm size of over 15 sq. km based in Dubai.

Camelicious produces more than 4 million liters of camel milk annually (~11,000 liters per day), which it uses to manufacture multiple products across four categories– Fresh Premium Camel Milk (flavored, plain pasteurized and Laban, a local variant), lifestyle drinks (coffee, performance drinks, family drinks) ice creams, and long-lasting variants(ghee, milk powder). In 2017, it was the first company to pioneer the baby milk

formula. It primarily uses a physical retail distribution network, available in all major modern retail outlets in the UAE.

The firm exports to foreign markets including the USA, Europe, Russia, Malaysia, Singapore, and other Gulf countries. The ice cream product line has been finding success in international markets like the UK.According to the Gulfood channel, it has witnessed a significant interest in the European market after receiving permission to operate in the EU. It is now looking to invest in opportunities in cosmeceuticals, nutraceuticals, pharmaceuticals, and beyond. In the Indian market, 1L of camel milk by Camelicious costs more than INR 500. In the United States, 500 gm powder (the only variant sold in the country) costs $100.

Owing to higher awareness about the category in the middle eastern region, the company offers a value proposition of unique health benefits – an abundance of nutrients and lower fat content in the edible category.

Desert Farms, USA

Incepted in 2014, Desert Farms is a USA based camel milk company founded by Wahid Abdul Wahab, a Saudi Arabian national. It sources camel milk from 8 major farms and camel herding families spread all across the USA. The brand aims to bring around a camel milk revolution worldwide and plans to expand sales operations to Saudi Arabia. Initially, it was started for health-conscious customers in California. As it expanded, 80% of the demand came from families with autistic children. It is estimated that the USA has a camel population of roughly 5000 camels. The firm had ~ 100,000 customers and recorded a revenue of 1.5Mn USD in 2016, which is estimated to be at 2.1 Mn USD in 2020. It also has operations in Europe, serving the UK, Germany, and Sweden among a few countries.

Desert Farms provides two options in the milk form – raw camel milk (which it delivers in a frozen state), and 'gently pasteurized' camel milk, each priced at $34 per liter. Both the variants are non-homogenized and come in environmentally friendly packaging. It also offers edible products like camel milk powder (priced at $370 per kg), camel fat for cooking (as a substitute for butter), camel milk Kefir, along with soaps and multiple other products in the skincare category.

Products are sold on Amazon, the company website, as well as through a network of retail outlets. It offers its customers to sign into a subscription model, wherein it delivers milk periodically to the subscribers. The brand incentivizes deep involvement/repeat purchases via a loyalty program – that rewards customers for posting quality reviews online, trying new products, and interacting on social media. The milk has an expiry period of 2 weeks in refrigerated conditions, and 6 weeks if kept frozen.

The main value proposition is based on the higher nutrient value of camel milk compared to cow milk and its special uses, especially for lactose intolerance and autism.

Q Camel, Australia

Established in 2006, Q Camel is an Australian Camel product company based out of Queensland. The Australian camel milk industry is estimated to produce 180,000L milk every year (2019), up from 50,000L in 2016 – a CAGR of more than 50%. The camel farms are open to the

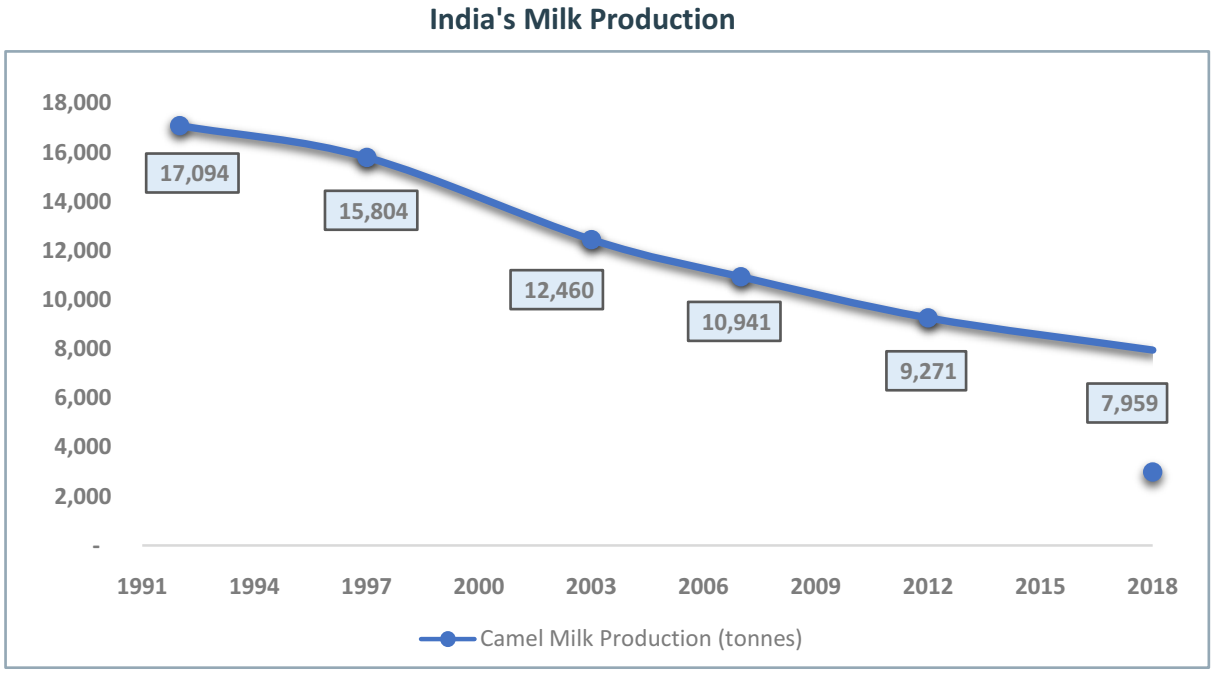
public and serve as a boutique tourist destination after having been featured on MasterChef Australia.

Q camel sells a range of edible and skincare products made from camel milk, including pasteurized camel milk, camel milk powder, yogurt, smoothies, feta cheese, chocolates, skin creams, facemasks, handwashes, and soaps. It is priced at a slight premium compared to competitors in Australia. The milk offered is 'gently pasteurized', with a shelf life of 2.5 weeks from bottling date extendable to up to 6 weeks if stored in a frozen state.

However, the scale of operations is limited, with only 110 camels serving the demand for camel milk. The group has a distribution network of over 100 retailers in Australia and exports its products to New Zealand and Singapore.

The key value proposition offered by the company is the health benefits like nutrients, healing properties of camel milk. It also offers an alternative for lactose intolerance with the promise of organic camel rearing, manufacturing, and the ethical treatment of its cattle.

Major Players - India

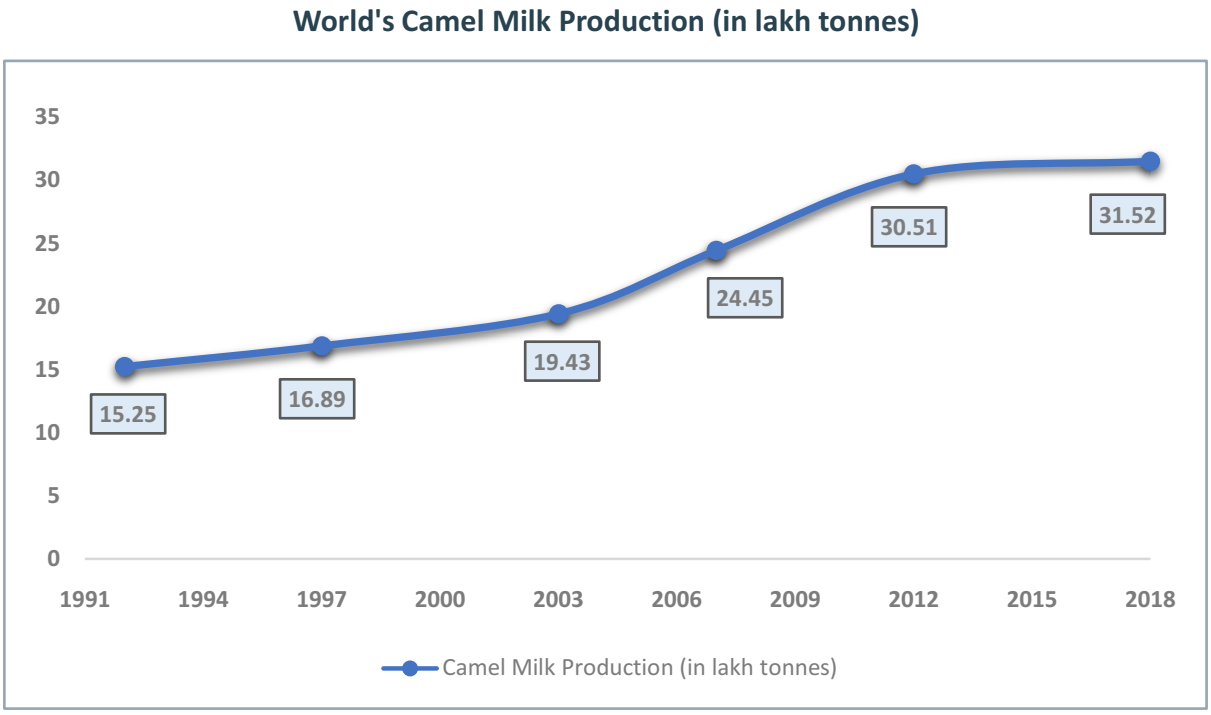


Source: Food & Agriculture Organisation of the United Nations[14]

In line with the declining camel population, camel milk production has also been on a declining trend in India. The total production of camel milk in Indiain 1992 was 17,094 tonnes, which has gradually reduced over time to mere 7,959 tonnes in 2018, while the world camel milk production has nearly doubled in the same period from 15.25 lakh tonnes in 1992 to 31.52 lakh tonnes in 2018.

Key trends

Since 2018, there has been some revival for the demand of camel milk products, driven by Amul's entry and portfolio expansion



Source: Food & Agriculture Organisation of the United Nations[14]

into the camel milk space. Some publicity and awareness were also generated among parents of autistic children due to the incident involving the Indian Railways going out of its way to deliver camel milk from Rajasthan to Mumbai at the request of an autistic patient's parent during the 2020 nationwide Covid-19 lockdown.

In India, market players in the camel milk space operate at different scales and sell a considerable range of camel milk products. However, the awareness and adoption of the product and its uses have not reached the same levels as in international markets like the Gulf and China. Hence, in the absence of a stable, consistent, and predictable demand, the scale of operations for most players remains limited. A brief of major players in India follows.

Aadvik Foods

Founded in 2016 in Bikaner, Aadvik Foods was the first camel milk brand in India. In 2019, it saw an annual turnover of INR 4 crores and has recently forayed into other categories like cow milk and goat milk as well.The company has a network of ~200 camel herders spread across Gujarat and Rajasthan and has a daily collection of up to 1,000 litersper month. It has offices in Delhi, Nokha, Bikaner, and Bhuj.

Aadvik Foods offers a wide range of camel milk products with the primary offering of freeze-dried camel milk powder - plain (INR 6,300-8,000 per kg, depending on the unit) and flavored variants (Chocolate, Banana - INR 4,000 per kg), which have a shelf life of 9 months.The firm claims that their freeze-drying process in their Baroda plant preserves all the essential nutrients in camel milk. It also offers frozen camel milk in a stock keeping unit (SKU) size of 200 ml, priced at INR 100 per bottle. In the edible category, it also lists a range of camel milk chocolates, at a price range of ~INR 170per100g. In the skincare range, it sells a variety of camel milk soaps, body cream, and moisturizers.

After starting operations only on their

website, their online presence has expanded to Amazon, Flipkart, eBay, and all major e-commerce players in India. In 2019, Aadvik had a recurring customer base of ~200 across the nation. It has a distribution presence in Major metros like Delhi, Mumbai, Chennai, Bangalore, and Hyderabad. It also serves high-demand nations like the USA, Malaysia, and the Philippines.

The primary value proposition for the company is the health benefits and the natural goodness of camel milk - in the areas of autism, diabetes, immunity building, and lactose intolerance.

Amul

Amul, a national player in the Indian dairy industry with a wide variety of businesses like milk, butter, cheese, chocolates, ghee, ice creams, etc., entered the camel milk category in 2018 with the initial offering of camel milk chocolates - a part of its chocolate range. Amul's camel milk processing operations are based out of the Sarhad dairy in the Kutch region, with an installed capacity of 3,000 liters per day. It has a network of 3 cooperative societies with 450 members in total, and procures up to 1,300 liters per day, down from 2,000 liters a day at the start of 2019.

The initial entry into the camel milk business with chocolate bars was followed by the sale of 500 ml camel milk pouches in select regions of Gujarat. Presently, Amul sells pasteurized camel milk in the ready-to-drink bottled form packaged in two SKU sizes - 500 ml and 200 ml - priced at INR 50 and INR 25 respectively. The shelf life of the milk form is 180 days from the date of production. In October 2020, Amul started producing camel milk powder and ice creams. The camel milk powder has a shelf life of 8 months and is expected to help extend the shelf life of milk and extend its availability through Amul' distribution network.

As a result of Amul's entry into the camel milk value chain, camel herders in the Kutch region have been able to gain a new source of income for rearing their cattle stock. This has led to renewed interest in camel herding and has even reversed migration from cities as the rearers are trying to increase their stock. The rates of camel milk have doubled in Gujarat as a result, thus hastening the revival of the sector. The price of camels has gone up to ~INR 30,000 – a steep increase from INR 1,500 since the ban on camel slaughter was imposed in 2014.

Starting with select markets of Gujarat for the milk category, Amul has leveraged its distribution network to reach major cities across the country. It also lists its products online on all major marketplaces like Amazon and Flipkart, usually in the form of bundled packs. It is expected to be able to cover a wider market after the introduction of long-lasting variants like camel milk powder and ice creams.

The main value proposition by Amul camel milk is the natural insulin like proteins which help control sugar levels in diabetic consumers.

Camel Charisma

Founded in 2010, Camel Charisma was born out of Ilse Köhler Rollefson's (a German veterinarian residing in India) efforts to preserve the indigenous Raika community that is traditionally involved in camel rearing. With improving infrastructure in Rajasthan, camels are no longer the primary means of transport in the region, leading to their obsolescence, and loss of tradition for the Raika community. Camel Charisma aims to provide alternative income sources for sustaining camel husbandry via tapping into their milk and fabric potential. It is based out of Sadri, Rajasthan.

Presently, Camel Charisma offers only 2 variants of camel milk products - frozen pasteurized milk, and cream cheese. The frozen milk is sold in a 200ml PET SKU, for INR 60 per bottle - with a minimum order quantity of 25 bottles. In the frozen state, the milk has a shelf life of 3 months and needs to be consumed within 3-4 days after defrosting.

It is the only player selling cream cheese in India, which is offered in 2 flavors forINR 400 for a 200ml SKU. The cream cheese has a shelf life of 3 weeks if stored under 4°C. Other than edibles, the organization also lists soaps made from camel milk, paper made from camel dung, and sweaters made of camel wool.

Camel Charisma has a limited procurement and distribution, when compared to Amul and Aadvik Foods, with weekly milk procurement of ~300L. It does not sell its products on Amazon or any other marketplace, and the B2C sales are limited to only their website.

The primary value proposition adopted by Camel Charisma is that of being an activist/conservationist enterprise striving to keep camel husbandry feasible for the Raika community by providing alternative means of income.

The Camel Partnership – Urmul Trust

The Camel Partnership, under the umbrella of Urmul Seemant Samiti, is a network aimed at developing a new socio-political and economic ecosystem in coherence with the changing scenarios to support a sustainable camel based industry. It believes that the industry creation will build a large and capable interest group who will take care of the different aspects of the ecosystem in which camel and camel based production system can sustain and thrive.

The Camel Partnership aims to mobilize the camel herding community, knowledge & potential and arrest the declining numbers of the camel population. It aspired to facilitate herders to take charge of their livelihood and drive an inclusive, accountable, collaborative, and, sustainable enterprise ecosystem. This partnership with the resource, technology, and knowledge support from multiple stakeholders and by forging diverse market linkages, would develop a resilient camel derivatives value chain and ecosystem in deserts.

The principles of cluster development have been adopted to ensure the wholesome connectivity of all the actors in the ecosystem. TCP aims at working in three core verticals - community, enterprises, and policies - engaging with 6,000 households in the first phase across the three camel milk clusters- Bajju, Chimana, and Pokhran spread across Rajasthan. Across the three focus verticals, the Partnership plans to systemically engage with stakeholders, design and promote scalable enterprise models.

As per the 2020 baseline survey conducted by TCP in Bajju and Chimana clusters, the camel population and daily sourcing capacity can be summarized as follows:

Villages	#Total Camels	# Male Camels	# Female Camels	# Lactating Female Camels	Avg. Daily Yield per camel (L)	Total Daily Yield (L)
Chimana	7,250	2,128	5,122	1,516	3.8	5,706
Bajju	3,205	924	2,281	546	3.0	2,037

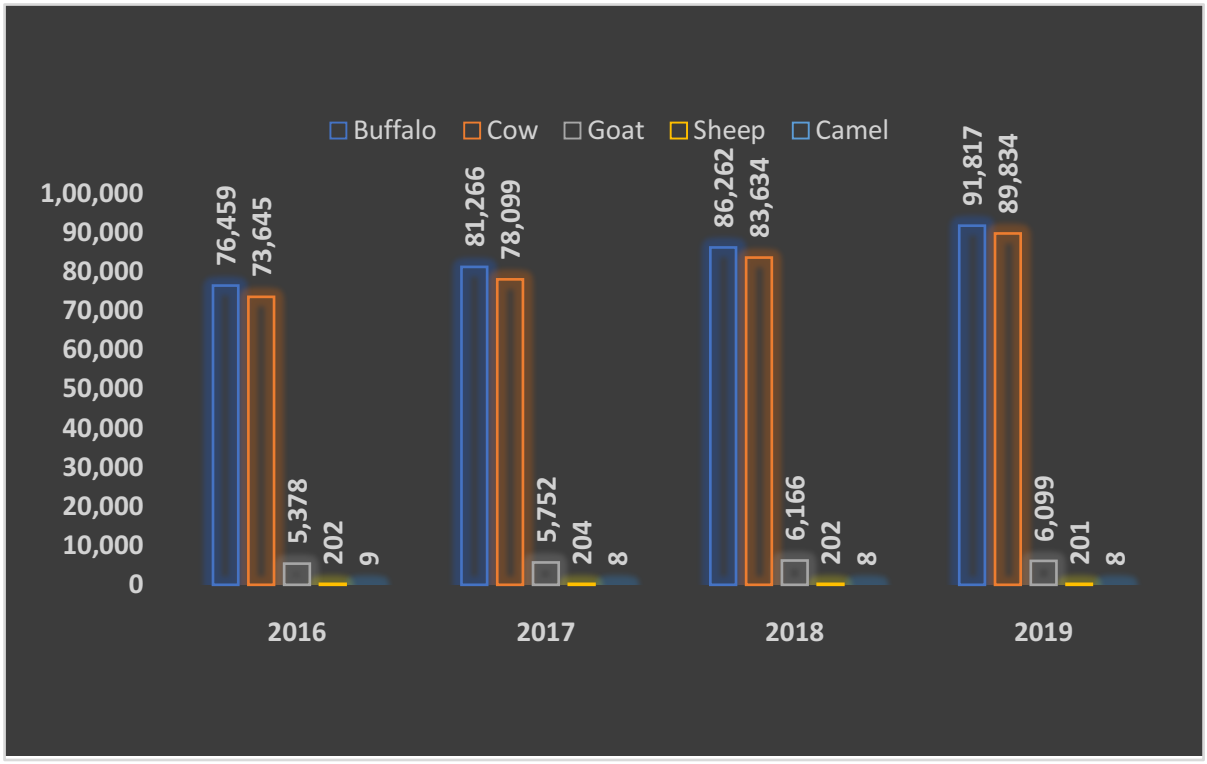
Source:*Primary Survey Data*

Indian Market – Industry Potential

Currently, the milk production in India is dominated by Buffalo and Cow Milk i.e. around 96-97% of production. The abundance and prevalence of bovine animals across the nation have resulted in the accepted use of their milk and growth in the cow milk industry.

However, with consumers now becoming more aware of the fat content in cow milk and the prevalence of various diseases such as diabetes and lactose intolerance, there is a need for alternatives to the traditional bovine milk. As a result, the usage and awareness of other alternative milk drinks have been increasing over the period and is expected to grow. As per Shrey Kumar, co-founder of Aadvik Foods, alternate milk like that of goat and camel is expected to rise to 5% of the total dairy consumption in India from the current share of 3%.

Milk Production in India (in '000 tonnes)



Source:Food & Agriculture Organisation of the United Nations[14]

Autism

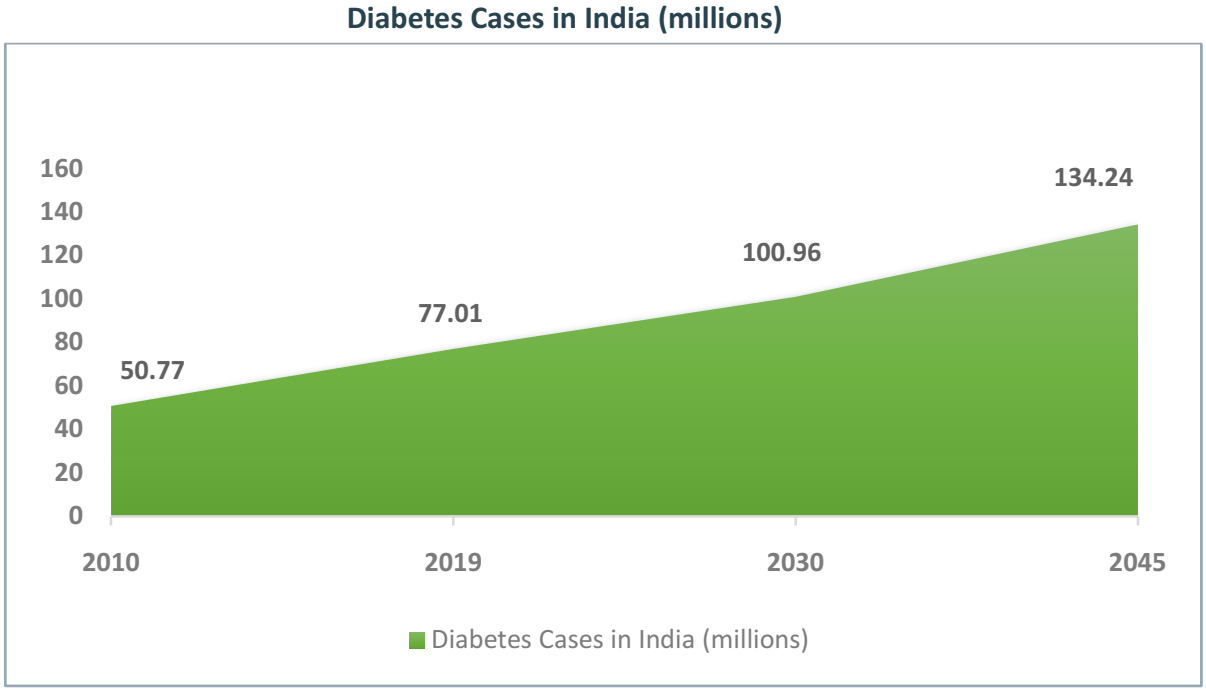
The population of India which is less than 14 years of age is almost approx. 26.62%, i.e. 365 million. Various studies conducted show a prevalence of autism of approx. 1% in children, indicating a total of approx. 2 million autism cases in India.

Lactose Intolerance

A recent study also indicated that almost 70% of the Indian population is lactose intolerant, and the prevalence is more in the southern region than in the northern region in India.

Diabetes

In terms of diabetic patients, India is second in the world with approx. 77 million patients after China, who leads the list with approx. 116 million.IDF Diabetes Atlas has projected the Indian diabetic numbers to reach approx. 134.3 million by 2045, growing at a CAGR of 2.25%.



Source: IDF Diabetes Atlas [23]

All the above factors indicate a strong demand market for camel milk subject to the rate of rising awareness among the Indian population regarding the health benefits of the camel milk. If the producers can commit to consistent supplies of the camel milk, then this is a golden egg waiting to be hatched.

Raika Community

Camel has been an integral part of the economy of the Thar – being actively utilized in economic activities, agriculture, trade, and transportation. As a result, the Raika community, which has been herding camels for hundreds of years – has been central to the economy and trade of the region. Many of the Raika villages (such as Tanwarwala) were geographically located in areas that were far away from water resources and arable land, yet in the junctions and nodes of nomadic trade routes, that traversed the Thar desert thus making them economically viable locations.

However, after the partition, most of these nomadic trade routes were disrupted (a huge part of the Thar lies in today's Pakistan) and with the coming of motorized transport, the relevance of camel as a mode of transport and trade, was driven obsolete. Finally, a 2014 Policy by the Rajasthan State Government declaring camel as the state animal and banning its slaughter, trade, and transportation outside the state made the situation worse for the herders.

Lokhit Pashu-Palak Sansthan (LPPS), an NGO set up in Rajasthan to support the Raika community, had set up its initial dairy plant in 2008 near Jaisalmer to supply the camel milk to local habitants, generally to diabetic patients. Camel Charisma and local Raika camel pastoralists have been testing the camel milk production at the LPPS Camel Conservation Centre's Kumbalgarh Camel Dairy near Ranakpur, Rajasthan, which was set up in 2015.

The milk is collected from the local herders, which is then pasteurized and frozen to transport it to Delhi and other cities. The milk can be kept frozen below -7°C for up to one year, but once thawed, it should be consumed within 5 days and must not be refrozen.

The camel milk business in the UAE, US, and Australia is usually commercialized, with camels having a limited diet, usually grazing grass or alfalfa and other fodder crops. The Thar Desert's unique landscape has flora which has been increasingly recognized as having therapeutic values. Thus, there arises a possibility that due to the enriching vegetation found in the Thar desert and Aravalli Hills, the region could be producing the healthiest camel milk in the world.

Kenya's Success Story

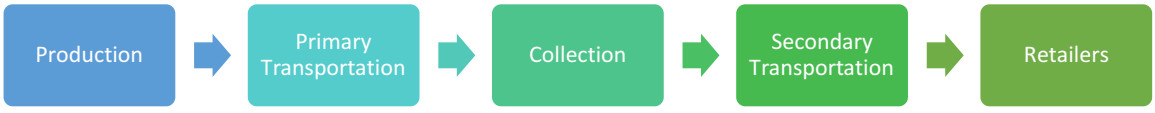
The secret behind the staggering success story of camel milk in Kenya has been a strong Borana and Somali community in Isiolo County,for whom the camel milk is a basic necessity due to the geographical conditions and circumstances. In Kenya, the camel milk constitutes about 60% of the total nutrients intake of pastoral communities dwelling in the arid and semi-arid regions.

Like India, in Kenya, commercializing camel milk was considered a taboo amongst the pastoral communities. Moreover, the camel herders are located in the deep, remote, arid regions, far away from the commercial markets. However, with more awareness, the pastoral community has realized the economic value associated with the product and has been taking appropriate steps to commercialize the same.

Thus, the camel milk market is quite significant, which provides economic motivations for rearing the camels. The community sells the milk only to the clan members in a cooperative social system and the aggregate collection from all the herders is then transported to meet the urban demands.

Also, to minimize the spoilage, various preservation techniques have been adopted in the region such as the usage of commercial lactoperoxidase systems (LS) kits, milk pasteurization, cooling facilities, clean water provision, and training on hygienic milk handling. Processing the camel milk into value-added products such as ghee, cheese, fermented milk (gariss, dhanaan, susaac), yogurt, and butter helps in preserving the camel milk nutrients especially during off-seasons and milk losses.

Typical Camel Milk Commercialisation Process

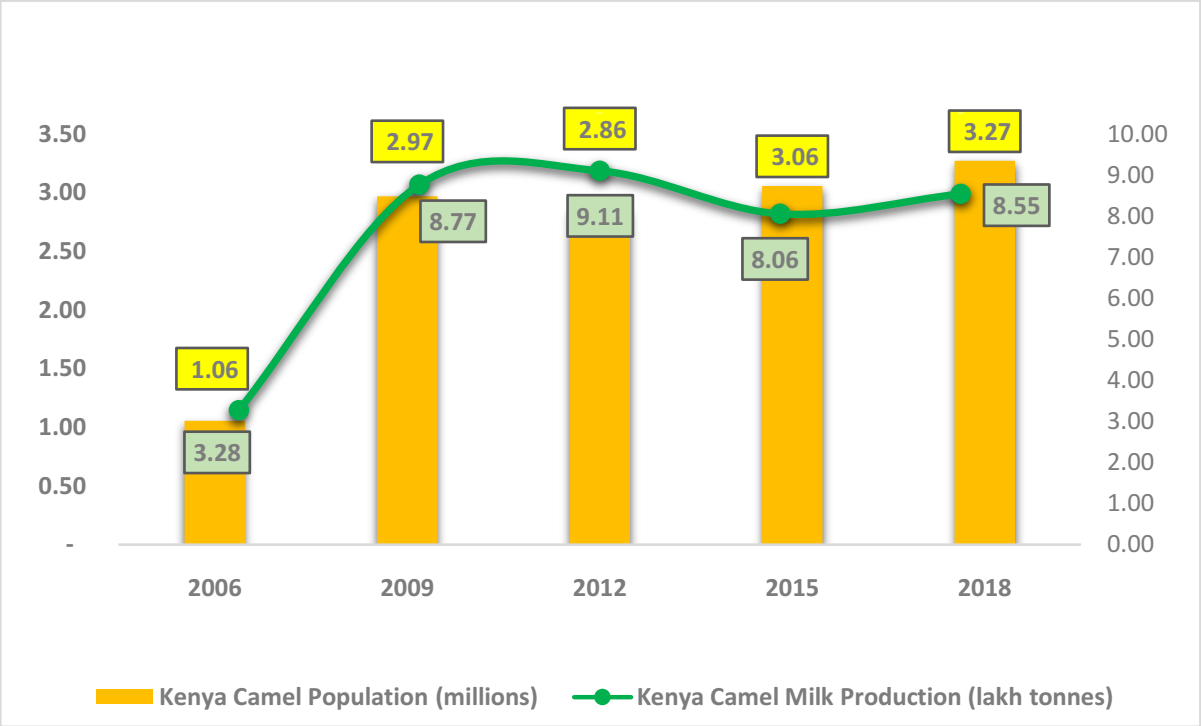


Production – by the local camel herders
Primary Transportation– from local herders to the community collection center
Collection – testing, preserving, and packing of the milk
Secondary Transportation – from community cooling hubs to urban retailers
Retailers – selling to the ultimate consumers

Other techniques adopted to reduce the spoilage include milking with clean hands, cleaning the camel udder, preventing contamination from camel urine, insects, and calf saliva, and smoking of the storage and milking containers. The herders carried out fumigation of milk to provide flavor and increase the keeping quality of milk for 12–24 hours without refrigeration. The community also utilized simple gunny bags soaked in water to cover the milk cans post collection to keep it cool during the transit.

Ultimately, the pasteurized milk was sold in Nairobi for US$ 2.5 perliter, while the producers obtained US$ 0.30 perliter in the wet season and US$ 0.69 perliter during the dry season.

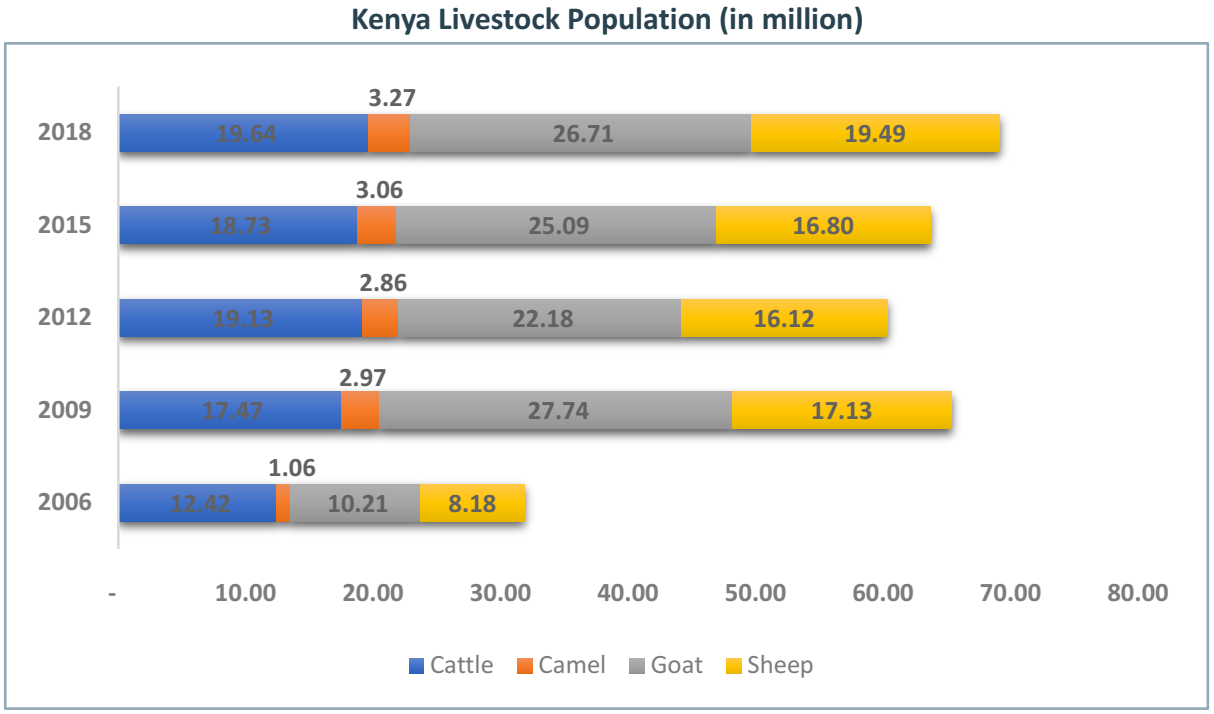
Kenya Camel Population and Milk Production



Source: Food & Agriculture Organisation of the United Nations[14]

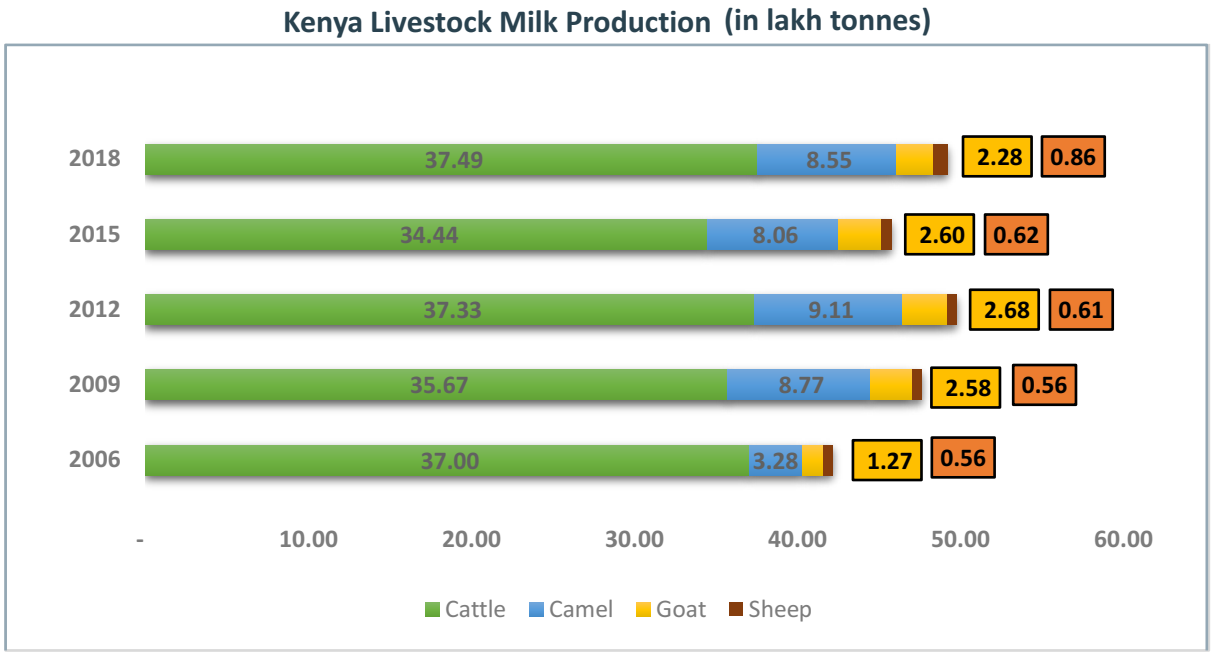
From approx. 1 million camel population in 2006 to almost 3.1 million in 2018, Kenya's camel population has risen at a CAGR of 9.08%, while the world camel population has risen at a CAGR of only 2.65%. At the same time, the total camel milk production has risen from 3.28 lakh tonnes in 2006 to almost 8.54 lakh tonnes in 2018, resulting in a CAGR of 7.64%, which is significantly higher than the World CAGR in the same period of 4.04%.

When compared to the cattle population, the population of cows has risen from 12.42 million in 2006 to approx. 19.64 million in 2018, resulting in a CAGR of 3.59%, whereas the population of goats has risen from 10.21 million in 2006 to approx. 26.71 million in 2018, resulting in a CAGR of 7.68%, and the population of sheep has risen from 8.18 million in 2006 to almost 19.49 million in 2018, resulting in a CAGR of 6.91%.



Source: Food & Agriculture Organisation of the United Nations[14]

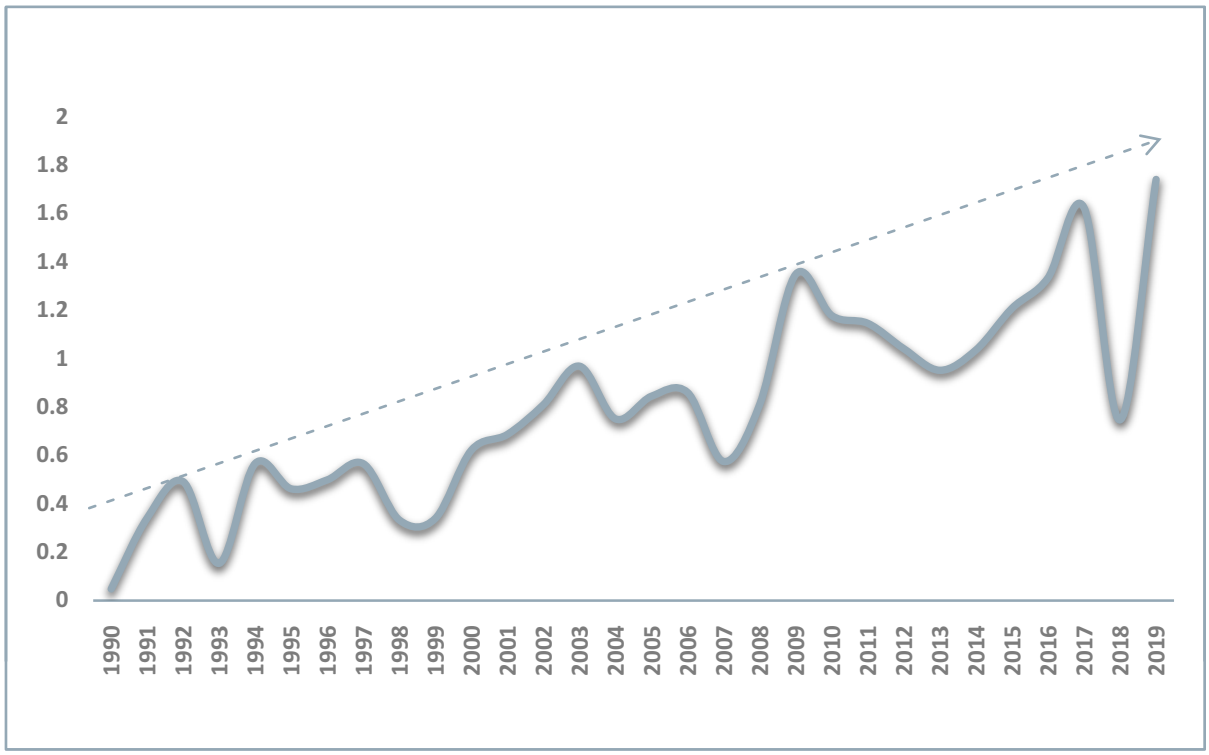
Interestingly, while the cattle population has gradually increased, the milk production has been relatively stagnant, indicating a gradual shift to camel milk consumption. The total cattle milk production remained almost unchanged from 37 lakh tonnes in 2006 to 37.49 lakh tonnes in 2018, while the production of goat milk surged from 1.27 lakh tonnes in 2006 to 2.28 lakh tonnes in 2018 and the sheep milk production remained insignificant and slightly rose from 0.56 lakh tonnes in 2006 to 0.85 lakh tonnes in 2018.



Source: Food & Agriculture Organisation of the United Nations[14]

The temperatures in Kenya have been on the rise in the last 30 years, which have resulted in more area being converted into arid and semi-arid regions, making the survival of bovine animals difficult. As a result, the country has seen a huge surge in the camel population and acceptance of camel milk for their daily nutrition and such trend has the potential to continue due to the global warming phenomenon being observed throughout the world.

Kenya - Annual Temperature Change (in° C)



Source:Food & Agriculture Organisation of the United Nations[14]

Having obtained knowledge about the causes of spilling/spoilage of milk, the community started taking measures to counter the losses, thus reducing the volumes of non-saleable milk. The spoilage occurring at the marketing level was mitigated by chilling and freezing, physical contaminants were removed through sieving of milk at the cooling hub.Proper hygiene and sanitation were maintained while transporting the milk to prevent contamination.Using wet gunny bags during transit helped to keep the milk cans cool.Smoking the milk containers enabled to transport of the milk over large distances at high temperatures without spoiling by preserving the milk quality.

The clan system enables the community to meet huge capital expenditures in the form of bulk milk chillers and processing plant facilities. Moreover, the government has realized the economic potential of this value chain, and hence there have been huge investments in the applied camel research and in setting up of cold chain facilities for seamless transport of the milk from rural to urban areas.

Value-Added Products

The camel milk can be supplied and distributed in various forms such as raw milk, pasteurized milk, milk powder, or can be even be supplied as flavored milk, like chocolates, as ice-creams, as lassi, kulfi and even tea or coffee or even milk-based soaps, body lotions, cream, and even curd and cheese. Globally, plain and flavored milk together constituted more than 55% of the total revenue in 2019.

The top players in the industry have been diversifying their product portfolio to accomplish their profit margins as they have to compete with a well-established bovine milk market. This requires huge investments. For instance, Camelicious – one of the largest players in the Middle East, has its in-house cheese production facility and it also supplies powdered camel milk to children's hospitals in Mexico for consumption by lactose intolerant babies.

Fresh, raw plain milk

Due to the high risk of bacteria and pathogens which can be formed in the raw milk, fresh raw milk cannot be commercialized and is best consumed locally by the Raika community. Drinking camel milk in its raw form is the safest means to consume it.

However, with the wider availability of cold chain logistics, few enterprises in India (Camel Charisma) and the world (Desert Farms) supply mildly pasteurized camel milk in the frozen state directly to the customers. The shelf life of the frozen form is drastically higher than that of the raw milk form going as high as 3 months if frozen properly.

Pasteurized milk

According to a study by the Central Veterinary Research Lab in Dubai, an appropriate level of pasteurization retains almost all the essential nutrients and health benefits of the camel milk, thus making it feasible to transport the same in frozen form post pasteurization.
While there is some debate about the nutritional value of the pasteurized products, most of the milk sold commercially in the liquid state is pasteurized – a practice that is followed in India by Amul, and by Desert farms and Camelicious outside of India.

Powdered milk

The powdered form, which can either be re-formed as milk or can be used in manufacturing camel milk-based chocolates, is the easiest form to supply the camel milk across the country and even for export. However, it poses a huge risk of losing its essential nutrients during the drying up process, hence it may not be as effective as consuming the camel milk in raw or pasteurized form. As per industry sources, camel milk to camel milk powder

has a conversion ratio of 8-8.5% by weight.

However, most companies that sell the powdered form have adopted the freeze-drying technology, which is said to able to retain all the essential benefits of camel milk. The shelf life of the powder is drastically higher at up to 9 months from the date of manufacturing and does not require cold chain support for storage and distribution. In India, Aadvik Foods, DNS Global Foods, and HyeFoods use this technology to produce camel milk powder.

Confectioneries

Sweetened products like ice-creams and chocolates are high margin products which have a relatively long shelf life compared to raw milk. One of the main reasons for the high margin is a lower percentage of camel milk by volume (~25%), while the rest of the composition comprises other ingredients, sugar, and milk from other cattle.

Since camel milk in powder or liquid form is consumed primarily for their health benefits, the consumption remains limited to specific segments like diabetics, autistic children, etc. However, dessert products are more a hedonistic purchase than a need-based one, and thus can be marketed to all segments as gourmet or health foods which retain all the benefits of camel milk while offering a pleasurable experience.

Fermented Products

Fermented products like camel milk cheese and curd have seen limited success and adoption due to the difficulty in curdling camel milk, and the extremely high perishability of the curdled form. Most attempts to make cheese have been unsuccessful and camel milk curd isn't sold commercially in India. While Camel Charisma has seen some success in selling cream cheese in India, but the shelf life remains very low – 3-4 days from the date of manufacture.

Skin Care Products

Skin care products made of camel milk base are purchased for their perceived nutrient value. Camel milk is very rich in natural alpha hydroxyl-acids, which help exfoliate dead skin to reveal new cells, as well as iron and vitamin D & C. The lactic acid found in camel milk also helps to even skin tone and brighten. Some of the products in this category include moisturizers, body washes, and soaps. Aadvik Foods and Camel Charisma have some presence in this category in India.

Therapeutic Values

Being rich in Vitamin C and protective proteins like lactoperoxidase, lactoferrin, lysozyme, and immunoglobulins, camel milk consists of important essential nutrients and therapeutic values and has been widely used to cure patients suffering from autism and diabetes. The camel milk contains 3times more vitamin C than bovine milk and 6 times more than human milk. Also, the lack of β-lactoglobulin, makes it a viable alternative for people who are lactose intolerant.

The camel milk also has various other properties such as antioxidative agents, being antibacterial, antifungal, antiviral, anti-hepatitis, anti-arthritis, etc. It also prevents aging and the lactoferrin in it has the potential to prevent the spread of cancer cells. Being rich in magnesium and zinc also makes it useful for curing ulcers.
The camel milk is widely used to cure autism, as was observed when the railways transported 20 liters of camel milk to a mother in Mumbai for her autistic son amidst the lockdown in April'20.

A comparison of camel milk composition with that of the milk by other species reveals the nutritional properties which the camel milk possesses.

Animal	Water %	Protein %	Fat %	Ash %	Lactose %
Camel	86-88%	3.0-3.9%	2.9-5.4%	0.6-0.9%	3.3%
Cow	85-87%	3.2-3.8%	3.7-4.4%	0.7-0.8%	4.8-4.9%
Buffalo	82-84%	3.3-3.6%	7.0-11.5%	0.8-0.9%	4.5-5.0%
Sheep	79-82%	5.6-6.7%	6.9-8.6%	0.9-1.0%	4.3-4.8%
Goat	87-88%	2.9-3.7%	4.0-4.5%	0.8-0.9%	3.6-4.2%
Human	88-99%	1.1-1.3%	3.3-4.7%	0.2-0.3%	6.8-7.0%

Source: Chemical Composition & Medicinal Values of Camel Milk study by Jimma University, Ethiopia [13]

Diabetes

Camel milk consists of high intensity of insulin (150 u per ml), which is enclosed within micelles and hence shielded from digestion. It is captured in nanoparticles which enable its absorption and smooth passing to the bloodstream. Various researchers have reported that the use of camel milk reduced the insulin doses by

diabetic patients. Also, the local pastoral communities consuming fresh camel milk have shown a low prevalence of diabetes among the habitats.

Autism

The camel milk comprises protective proteins which are essential for activating the immune system and nutritional benefits for the development of the brain. Various studies have revealed that the children suffering from autism who consumed camel milk displayed a decline in autism symptoms and significantly improved their language, joint coordination, awareness, skin health, overall behavior, and diet.

Lactose Intolerance

Camel milk acts as the perfect substitute for people suffering from lactose intolerance from cow milk as the camel milk contains low lactose of small molecules, which is easily processed and metabolized by the human body.

Anti-Bacterial and Antiviral Properties

The higher concentration of lactoferrin and lysozyme than that found in bovine milk reveals that the camel milk is rich in anti-bacterial and anti-viral properties. It is also found to possess therapeutic properties to treat tuberculosis. Camel milk has a synergistic reaction with antibiotics that can decrease the dosage of antibiotics and reduce themicrobial antibiotic resistance.

Crohn's Disease (Inflammation in the digestive system)

Camel milk possesses strong bactericide properties, which when combined with PGRP result in quick recovery and expedite the healing process as the bacteria is associatedwith the family of tuberculosis, and camel milk has been used to treat tuberculosis.

Diarrhea

The protective proteins – lactoferrin, lysozyme, PRP, and LPincamelmilk haveantidiarrheal/antibacterial action along with high levels of antibodies against rotavirus, which subsides the diarrhea.

Anti-aging

The vitamin C present in high levels in the camel milk has antioxidant properties which are responsible for tissue repair and protection activities. The antioxidants also decelerate the pace of free-radical damage which results in dryness and wrinkles in the skin.

Hepatitis

The camel milk has been scientifically proven to cure both hepatitis B as well as C through the special fat which relaxes the liver and has advantageous action on chronic liver patients. The high-level of ascorbic acid in camel milk facilitates in improving the functioning of the liver.

Arthritis

The lactoferrin present in the camel milk removes the free iron from the joints of arthritic patients and hence aid in improving the recovery of the patients suffering from arthritis.

Skin Diseases

The natural ingredients such as vitamin B, C, iron and carotin content present in the camel milk provides a comforting and a relaxing effect on the skin, which keeps the skin fresh and beautiful and also treats

various skin disorders such as dermatitis, eczema, acne and psoriasis.

Allergies

The milk protein - β-lactoglobulin, which is prevalent in cow milk, is liable for causing allergies in humans. This protein is absent in camel milk, and hence consumption of camel milk does not cause allergies in humans. Various studies have revealed that children suffering from acute food allergies showed significant improvement with consumption of camel milk as it contains immunoglobulins, which is similar to that found in mother's milk, thus plummeting the allergic reactions in children and strengthening their immune system.

Cancer, Tumour and Ulcer

Camel milk contains lactoferrin. A study has confirmed lactoferrin's ability to prevent the rise of cancer cells in vitro by 56%, and repair DNA damage. Camel milk contains anti-tumor properties because of powerful antimicrobial and anti-oxidative behaviors which aid in reducing liver inflammation and camel milk is enriched with nutrients that are necessary for healthy liver functioning.

Freeze Drying Technique

Owing to the high perishability of camel milk, and the threat of nutrient loss after ultra-high heating treatment,freeze-drying milk to powder form is a viable alternative. The process preserves the structural integrity of the constituents of camel milk and can lengthen the shelf life to 8-9 months. Freeze-drying, also known as lyophilization, can be defined as a water removal process typically used to preserve perishable materials, to extend shelf life, or make the material more convenient for transport.

Owing to the high perishability of camel milk, and the threat of nutrient loss after ultra-high heating treatment freeze-drying milk to powder form is a viable alternative. The process preserves the structural integrity of the constituents of camel milk and can lengthen the shelf life to 8-9 months. Freeze-drying works by freezing the material, then reducing the pressure and adding heat to allow the frozen water in the material to sublimate.

Freeze Drying's 3 Primary Stages:

Freeze drying occurs in three phases, with the first and most critical being the freezing phase. Proper freeze-drying can reduce drying time by 30%.

Freezing Phase

There are various methods for freezing the product. Freezing can be done in a freezer, in a chilled bath (shell freezer), or on a shelf in the freeze dryer. Cooling the material below its triple point ensures that sublimation, rather than melting, will occur. This preserves its physical form.

Freeze drying is easiest to accomplish using large ice crystals, which can be produced by slow freezing or annealing. However, with biological materials, when crystals are too large they may break the cell walls, and that leads to less-than-ideal freeze-drying

results. To prevent this, the freezing is done rapidly. For materials that tend to precipitate, annealing can be used. This process involves fast freezing, then raising the product temperature to allow the crystals to grow.

Primary Drying (Sublimation) Phase

Freeze drying's second phase is primary drying (sublimation), in which the pressure is lowered and heat is added to the material in order for the water to sublimate. The vacuum speeds sublimation. The cold condenser provides a surface for the water vapor to adhere and solidify. The condenser also protects the vacuum pump from the water vapor. About 95% of the water in the material is removed in this phase. Primary drying can be a slow process. Too much heat can alter the structure of the material.

Secondary Drying (Adsorption) Phase

Freeze drying's final phase is secondary drying (adsorption), during which the ionically-bound water molecules are removed. By raising the temperature higher than in the primary drying phase, the bonds are broken between the material and the water molecules. Freeze dried materials retain a porous structure. After the freeze-drying process is complete, the vacuum can be broken with an inert gas before the material is sealed. Most materials can be dried to 1-5% residual moisture.

Distribution Channel

Globally, and even in India, camel milk is mostly distributed through offline channels – majorly through large retail outlets, supermarkets, and hypermarkets, which constitutes more than 80% of the market share.The developed nations such as the USA and the European nations still prefer modern trade channels, however, the emerging nations such as China, India, Indonesia, and South Korea have seen a huge growth in the e-commerce market.

Globally, the online distribution channels are expected to grow at a CAGR of 8.6% from 2020 to 2027 and COVID has only expedited this growth further due to stringent lockdown norms in many countries, thus forcing people to adapt to the online mode of shopping.

Latest Study to Make Camel Milk Safer

In Africa, around 9% of the milk production originates from camels, which are usually available at local markets as fermented products, or the roadside stalls. The quality and safety of milk are reliant on the rate of infection by pathogens such as E.coli, Listeria, Salmonella, etc. Due to the lack of cooling facilities in Africa, the fermentation in camel milk is almost spontaneous, thus compromising the milk quality. A recent study conducted by The Technical University of Denmark (DTU), revealed that using some strain of L.lactis – a gram-positive bacteria which is widely used in the production of cheese and buttermilk, have antimicrobial properties which can hinder the evolution of food-related pathogens in both raw as well as pasteurized camel milk.

FSSAI Regulatory Guidelines

The FSSAI has drafted standards to regulate the camel milk supply. According to the guidelines issued in November 2016, the minimum content of milk fat was decided to be 3.0% and the Solid Non-Fat (SNF) content was decided to be 6.5%. However, in June 2017, the limits were reduced to 2.0% and 6.0% for Milk Fat and SNF content respectively, after consulting with various stakeholders.

Challenges

The camel milk industry has its unique challenges, which are very different from their competitors – the cow and buffalo milk industry. The various challenges faced by this industry in India are:

Lack of Awareness and Apprehension about the Product

The product is very niche and unheard of, is way down the pecking order of the customers for milk substitutes. Having done a few interactions with some of the end consumers during the primary research, we realized that a lot of consumers have some apprehensions regarding camel milk even by the thought of it. This is primarily because there is no established brand in the market barring Amul (a relatively new entrant in the camel milk space) and thus, the consumers are not comfortable with the thought of trying out the camel milk.

Inconsistent Supply

The product has been gaining inquiry and interest from the consumers. However, the inconsistent supply has resulted in the de-listing of the product from a few of the e-commerce platforms. This points to the fact that the producers of camel milk are unable to match the demand quantities for the product across the nation, thus resulting in de-listing of their products from e-commerce platforms.

Geographical Constraints

Large camel populations are primarily concentrated in desert and arid regions such as that of western Rajasthan and Kutch region in Gujarat. Due to this geographical restriction, there is intense pressure on these two regions to satisfy the needs of the entire nation. Moreover, the high temperatures in the two regions make the milk more vulnerable to be spoilt, and hence there needs to be a grade-A cold chain storage facility in place in these locations to keep the milk fresh.

Low yield per camel

The average yield from the camels is usually 4-6 liters per day, whereas the average yield from the cows is usually12-15 liters per day, thus making the milk availability insufficient and limited.Thus, while the rearing cost per day is roughly the same for both, the output is considerably lower. This is exacerbated by the shorter lactating period for camels as compared to cows and buffalos.

Declining Camel population

The camel population in India has declined from 10.31 lakhs in 1992, to almost 2.5

lakhs in 2019, thus impacting the supply of camel milk to cater to the growing demand.Lately, this has been fuelled by large scale road-building projects in Rajasthan, which drove the camel herders to obsolescence as the primary transport service providers in the desert. Thus, with the primary source of income disappearing, camel trade has started becoming unsustainable in the state of Rajasthan – the state with the highest camel population in the country.

More expensive than bovine milk

The camel milk is relatively more expensive than bovine milk due to its scarce availability and lower yield. For eg, Camelicious charges US$ 13 perliterfor camel milk in Europe, whereas for cow milk, it charges only US$ 0.4 perliter and similarly, Desert Farms charges US$ 35 perliter for camel milk in the USA, but for cow milk, it charges only US$ 0.8 perliter.

Supply Chain Constraints

The shelf life of camel milk is 30% less than that of cow milk, thus making the storage and supply of the product across the country, difficult. India lacks a sufficient number of Grade A warehouses and cold storage facilities and the supply chain facilities in India are still evolving. This deficiency in the appropriate supply chain makes it difficult to cater to the rising demand for camel milk across the nation.

Recommendations

Collaboration with Government Nutrition Programs

Rajasthan is one of the leading states in terms of malnutrition among young children. Around almost 23% of the children born in the State are underweight and approx. 39% of the children below the age of 5 are stunted, while 46.8% of the women of the child-bearing age are anemic. The vital health and nourishment inputs reach less than 55% of the mothers and children and poor nutrition manifest in terms of growth failure of children, muted learning ability, and augmented morbidity and mortality rate. Such nutritional deficiencies adversely impact the overall health, well-being, and development of the children in the state.

Hence, the collaboration with the government for their nutrition programs can ensure widespread use of camel milk for providing adequate nutrition to the undernourished children in Rajasthan. This can act as a bridge between the camel milk that is being produced and its efficient usage within the state for the development and of children and empowerment of the community.

Camel, being the State Animal, can be used to promote the endangered species. Every month, the government can fund for providing camel milk to the malnourished population of Rajasthan, to uplift the base of the pyramid population in the State and provide them with nourishment. Mr. Hanwant Singh from Camel Charisma emphasized that there is a huge problem of demand and supply mismatch. This, along with a lack of awareness about the therapeutic properties of camel milk, has resulted in an oversupply of milk in the region. With government intervention and appropriate media coverage, we can channel the oversupply of camel milk to appropriate use and can pave the way for a positive route to attract private investments and other sources of funding to develop the camel milk value chain.

Target State - Kerala

A study reports that the Indian population in the Gulf constitutes approx. 10 million, of which around 2.5 lakh are Keralites. This is also supported by the fact that the State is a remittance run economy as more than 36% of the state's GDP is due to the foreign remittances from Keralites living outside the country. Hence, since Kerala has a larger target audience based out of the Middle East, the likelihood of them being exposed to camel milk, either directly or indirectly via friends, relatives, etc. is the maximum compared to any other state. Hence, the company must target Kerala as one of its core segments for business and market development.

Focus on Camel Milk Powder

Thepowdered camel milk has its vast usage in both – direct consumption and as an intermediate raw material for producing chocolates, cookies, soaps, and other bakery products. Hence, focusing on producing high margin powdered camel milk can help the organization maintain its profit margins since this value-added product would have a larger sales market in the B2B segment, and thus, enable the organization to sustain the demand.

Partnering with Doctors

The primary research revealed that the primary source of medical intake for the people suffering from any ailments such as Diabetes, Autism, etc. is their doctors. Despite the therapeutic values possessed by the camel milk, it will not be easy to convince the people suffering from such ailments to consume camel milk unless the product is recommended by their trusted doctors. Hence, it will be extremely pivotal to increase our presence among the doctors in this field by organizing seminars, webinars, personal approach, etc.,and convincing them topersuade their patients to consume a healthier alternative to medicines – Camel Milk.

Gourmet Value Proposition

Since all the major players in India offer specific health-based value proposition like benefits around diabetes, autism, and lactose intolerance, new entrants in this category can explore the gourmet superfood proposition. This category is growing fast in India and seeks just the benefits that camel milk offers – immunity building, lower casein content, lower fat content, etc. Also, such a position allows us to tap into the larger general segment – beyond the specific health benefit seeking segment that the industry largely focuses on today.

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URMUL TRUST

URMUL Trust, Urmul Bhawan,
Near Roadways Bus Stand Bikaner, Rajasthan (334001)
Tel: + 91 151 2523093; email: mail@urmul.org;
www.facebook.com/Urmul/