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Camel milk products as a vehicle for innovative business opportunities in the global halal economy

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ABSTRACT

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While camel milk has long been a sustainable traditional food in drylands and rangelands, it is increasingly being used by non-pastoral people in major American and other global cities. Research was conducted to determine the current practices of camel farmers and camel dairy stakeholders, particularly dairy producers in the US and dryland countries. Methods included direct communication with dairy producers, consumers, pastoralists, scientists, doctors, retailers and social media data. Literature reviews, farm visits and conferences were undertaken. The goal was to establish some parameters of the current camel milk market to provide a baseline for halal camel milk consumers, and secondarily examine the potential of the camel tourism market. The various types of camel milk products in the US were determined to range from fresh raw, VAT and flash-pasteurized liquid, frozen liquid of the same types, and imported powdered milk either spray-dried or freeze-dried. Similar products are available in dryland countries with more abundant camels. Various methods for closing sales, making deliveries and creating adequate milk preservation methods are found in all camel dairy operations. Trends for camel milk are upward despite these common challenges, as camel milk use is growing among consumers. Halal consumers represent a promising and largely untapped market for this halal food due to health demands, cultural pride and halal tourism opportunities.

Introduction

Camel milk is a halal food, with camels mentioned in the Qur'an and ahadith, it is an important food to Muslims the world over. Camel milk, fat, meat, urine and organs have been used for centuries in Arabian, African, and Asian cultures as staples and healing foods. The milk has served as a sole source of nutrition and even hydration in challenging times, with young children learning to herd camels in Somalia reporting subsisting off camel milk alone for two

ears (Adams, 2019). The milk is gaining increasing recognition as a unique food with notable qualities such as antiviral, antibacterial, and anti-inflammatory attributes. Vitamin content is good, with vitamin C as a noted presence in many countries.

It has long been used as a healing substance by pastoralists, urban and rural communities in arid countries and is often referred to as "nature's pharmacy." Scientific reviews of the literature have concluded that it is suitable for those with severe cow milk allergies and food intolerance

and is noted to be beneficial for autism, diabetes, liver protection, and may have anti-cancer, anti-viral and anti-tumor properties, among others.

Yet very few references to the commercial use of camel milk for the halal market can be found. With 109 billion Muslims in the world,¹ many affluent Muslim consumers are increasingly seeking out healthy and interesting new food options. Additionally, as 1 of every 44 US children has autism,² these children often have comorbid food sensitivities and observe a cow milk--free diet that often allows camel milk as an alternative dairy source. People with lactose intolerance and other conditions also seek a non-allergenic dairy source with calcium and protein, and are a segment of camel milk consumers. For instance, one Indian company sells 80% of their milk to families of autistic children and another has 300,000 customers purchasing for autism and height growth. With the Middle East having the top ten highest rates of autism in the world, demand by this food-sensitive population is a growth opportunity.

Ancient traditions developed by pastoral and Bedouin-type cultures help sustain biodiversity of life and lead to greater health for humans and animals. Economic improvements can result from practical applications of this type of ancestral knowledge. Camels, a chronically undercounted yet vital livestock animal typically kept by nomadic and Bedouin-type cultures, are estimated to be over 40 million head and could reach 60 million in 25 years if the trend continues. The 46-plus countries harboring camels mostly see camel headcounts increasing (Faye, 2020). An economic benefit of this growth is the global camel milk market, with a valuation of USD 6302.31 million in 2021. Growth is expected at a CAGR of 6.6% during the forecast period, hitting USD 9250.1 million by 2027.³

Materials and Methods

While camel milk has long been a sustainable traditional food in drylands and rangelands, it is increasingly being used by non-pastoral people in

major American and other global cities. It is important to establish the parameters of the current and emerging market to provide a baseline expectation for how growth may occur similarly or diverge to serve the halal milk and secondarily, the camel tourism market. The research for this project included examination and outreach into global camel milk production, marketing, and delivery methods, plus a look into the use of camels for non-dairy purposes.

Research methods used included travel, personal and remote engagement. One method was engagement with WhatsApp chat groups of camel stakeholders, WhatsApp and email communications with camel farmers and nomadic camel pastoralists, engagement with Facebook communities and various social media profiles of engaged camel milk stakeholders, phone and video calls with stakeholders, conference attendance, on-farm visits, and gatherings of scientists, veterinarians, consumers, producers and retailers. Reviews of camel-related and other science publications and camel pastoralist and science conference presentations were sources of information.

Adams traveled to Saudi Arabia, India, Turkey and the US in 2022 and engaged with pastoralists, environmental and animal scientists, medical doctors, veterinarians, camel milk retailers and end users globally. Adams was featured in and helped produce the film *Autism Spectrum Disorder and Camel Milk*, a finalist at the 12th Annual National Science Film Festival of India in 2022. Adams was a speaker at the King Abdulaziz Camel Festival's global conference on camels and met with Bedouins and other camel stakeholders in December 2021. She spoke at the Raj Rishi College International Environmental Conference in India and held discussions with veterinarians, scientists and doctors during an outbreak of bovine lumpy skin disease. Research of PubMed publications, and consulting with and researching camel milk retailers in the UK, US, India, Mongolia, Kazakhstan, Pakistan, Algeria, Morocco and Australia was undertaken. Adams researched the Maldhari community for her

¹<https://worldpopulationreview.com/country-rankings/muslim-majority-countries#:~:text=Islam%20is%20the%20world's%20second,more%20than%201.9%20billion%20Muslims.>

² <https://www.cdc.gov/ncbddd/autism/data.html>

³ The Express Wire, Camel Dairy Market Size, Share, Growth Statistics By Top Key Players: Tiviski Dairy, Camel Milk Victoria, Kamelenmelkerij Smits, Jan 9, 2023

February 2023 lecture at Verghese Kurien Centre of Excellence (VKCoE), Institute of Rural Management Anand (IRMA), in Gujarat, India. She researched and/or interviewed Pakistani camel milk producers and dairy stakeholders for her March 2023 lecture for the Islamia University of Bahawalpur, Pakistan on Camelids at Dairy Science Park. She attended the 2022 Summer Fancy Food Show in New York City and the 2023 Natural Products Expo West in California to determine the global receptiveness of food professionals to camel milk, where she conducted questioning pertaining to camel milk commercial opportunities, researched importation and supply chain requirements, consulted with experts on selling to wholesalers, and the requirements for retailing camel dairy products.

Maffei attended the Gulfood Show in Dubai where she researched GCC camel milk product companies and products. She presented and promoted products for the Halal Expo Canada and was a key panelist at the Islamic Development Bank Private Sector Forum in Sharm el Sheikh, Egypt in order to discuss key opportunities for Halal products in the American consumer market. She also spoke most recently at Yale University for the Mediterranean Roundtable event about Getting Halal Right, in order to explain key insights into the culinary applications of using Halal ingredients to create various global cuisine, but also to present opportunities for Halal certification in key consumer market sectors, locations and seasons (i.e. Ramadan, Eid). She has served as an advisor to the Uzbekistan government by presenting at the Tashkent International Tourism Fair (2020); presenting *Demystifying Muslim Food-Loving Travelers* at the World Food Travel Association Food Trex Global (2020); presented *Around the World on a Halal Diet* for Food Travel Talk TV (2021); *Rethinking Experiences and Activities: The Next Big Thing* at the Halal in Travel Global Summit (2021). Reading key journals and studies in the culinary tourism sector was also conducted. Other sources are cited in the bibliography.

Results and Discussion

Since the early days of the US camel milk launch as a commercial product around 2011, which was done by Amish farmers in Midwestern states such as Pennsylvania, Michigan and Missouri directly

selling raw liquid camel milk, the market has matured from a tiny word-of-mouth and Facebook-driven consumer base, to a small but thriving one with increased choices of milk. These products range from various forms of liquid (raw, VAT pasteurized and flash-pasteurized, in fresh or frozen) to two types of imported powder (spray-dried and freeze-dried). In addition to camel farmers, there are now also non-farm retailers who resell the farmers' milk, and retail imported milk powder and imported camel milk chocolates as well.

It was determined that there are various means of milk marketing and delivery to the US camel milk consumer market. These include: on-farm sales (where consumers pick it up in accordance with state laws governing the sales of raw and pasteurized milk); off-farm sales (when it can be sent out via delivery methods such as shippers, trucks, and other cold-chain-friendly transportation methods); online sales by independent and wholesale camel farmers; online sales by retailers via their websites; various social media platforms and websites, some run on behalf of Amish farmers due to religious limitations on their use of technology; in-person events (still rare); retailers selling on Amazon virtual storefronts; and sometimes consumers reselling milk that they bought and did not use to consumers with similar health profiles (by utilizing Facebook social media and via word of mouth).

Camel dairy farmers are selling raw milk directly from their farms in states that permit such sales, and may sell pasteurized liquid milk outside their states, both under their own labels and as a wholesale supplier for retailers. The liquid milk is shipped with cold packs, via one, two or three-day shipping options, by common carriers. It is most often sold in plastic pint bottles, although some very health-conscious consumers with autistic and ill family members will pay extra to have it shipped in glass bottles (to avoid plastic contact).

While still an extremely modest increase, doctors and nutritionists are more frequently telling their clients about camel milk as an option over the last six months (as reflected in the self-reported reasons for requesting admission to an established Facebook group for the use of camel milk). An informal monitoring of social media for one year shows that smaller ethnic grocery stores

are increasingly incorporating camel milk into their dairy lines in the Midwest and other US markets (one example is Camel Culture, a camel milk retailer in the US catering to smaller ethnic groceries, niche consumers, Somali community members and social media users). Many of these smaller ethnic markets cater to Muslim consumers, some of whom may also purchase halal items carried by these stores. Additionally, the powdered camel milk (which comes from India, Australia and the UAE) is being sold in the US on a very small scale in a few offline outlets. Secondly, many US camel owners report engaging in the tourism market in a minor way, but one that represents significant income to them. One example is use of camels for weddings, camel dairy farm tours for paying visitors (as seen at Oasis Camel Dairy in California), camel rides and camel use for festivals and holidays. While there are large established festivals and races for camels in the Middle East, India, Turkey, Central Asia and others, typically they have not been linked to dairy use and are not significantly marketed to tourists, even local Muslim ones. Considering that male camels are often considered excess in the dairy farm process (as they do not produce milk and very few bulls are needed to breed females), and are often sold for meat in various countries (although not the US due to the scarcity and high price of camels), castrating males to calm them and then using them for tourism purposes would offer another revenue stream. (Castration is a common safety practice in the US as most camel owners do not have deep familiarity with or routinely handle bull camels.) While the current camel milk market in the US is not defined by faith and is far more driven by health needs (autism is primary, while food intolerance and gut and digestion issues are also prominent among users), there are some insights into the potential halal customer. Years of consumer interviews by the author (Adams) has shown that a good many Muslim adherents and Muslim potential milk consumers report awareness of camels being mentioned favorably in Islam. They are predisposed to view the milk positively. However, those from some countries,

especially Saudi Arabia, have heard of camel milk inducing gastrointestinal problems like diarrhea. This could theoretically be due to the presence of bacteria in non-hygienically handled camels along the roadside where many city dwellers go to obtain camel milk when in need. However, it may just be that they are not used to it; camel milk's antibodies are noted to possibly have an antigen-piercing affect and can kill bacteria and other pathogens in the human body, so the 'flushing' effect that nomadic and city dwellers sometimes refer to could be partly due to die-off (a Herximer effect) of such pathogens, although this is a common patient conjecture and not confirmed. This type of lore can be a slight barrier to the acceptance of camel milk among Muslims who are aware of it.

The potential for camel milk as a global product reached 7.3 billion in 2022. According to IMARC Group, this is expected to reach 9.0 billion by 2028, a CAGR growth rate of 3.46%, with health-conscious consumers driving this trend. The market for camel milk can be segmented into such offerings as raw, pasteurized, or powdered (particularly for export markets) and flavored or unflavored, camel milk cheese, yogurt, laban, ghee, ice cream, and even infant milk formula.⁴ The FAO reports that camel milk from around 39 million camels worldwide is produced under low-input, low-output systems where lactating camels produce lower amounts in Africa (1,000-2,700 liters per lactation) versus South Asia (up to 12,000 liters per lactation), reaching their maximum amounts in the second or third month of lactation and driving the price significantly higher than cow milk. Arabian camels, however, produce significantly higher yields than Bactrian camels and are therefore being used increasingly more in larger dairy production systems.⁵

Countries in the Middle East are poised to successfully revive the trade of camel milk, but China is a surprisingly new player with a taste for camel milk, as well. During the Covid-19 pandemic, Kazakhstan began exporting camel dairy products such as milk powder when they became officially legal on Jan. 29, 2020 and were produced by a dairy factory established by Kazakhstan's Eurasia Investment. A powdered

⁴ IIMARC.Camel Dairy Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028. Report ID: SR112023A1046 <https://www.imarcgroup.com/camel-dairy-market>

⁵ FAO Gateway to Dairy Production and Products. <https://www.fao.org/dairy-production-products/production/dairy-animals/camels/en/>

camel milk store was opened at the International Border Cooperation Center, garnering 1.5 million USD in sales.⁶

The remote locations of most camel dairy farms makes it challenging on one hand to deliver products: however, during the pandemic, some companies began to innovate by storing products in warehouses near centers where they can be delivered to the doorsteps of its customers, as was the case with Kazakh-China trade during Covid-19 where border crossings and quarantine made it difficult to export otherwise.

In the US, although 97% of Americans get their dairy products from cows, the interest in and demand for camel milk is growing due to its noted health benefits, proven by unbiased scientific research mentioned in this research paper. Camel milk is mostly available for purchase online in the US in pasteurized, raw and powdered forms.⁷

The tourism sector could benefit from a collaboration of experiences with camels as part of trips throughout the Middle East, Africa, South Asia, Australia, and even parts of the United States where camels are prevalent (such as Missouri, Texas, California, Pennsylvania, Nevada and more). Their products could potentially provide a sustainable source of food and eco-friendly consumables and cosmetics for people in arid and semi-arid climates around the globe, while also providing a rich source of income for trade of milk and by-products in business related to agritourism, adventure travel and the increasingly popular gastro tourism sectors.

As such, the post-pandemic period is an excellent time for businesses and hotels to analyze and prepare the opportunities for unique experiences that include pastoralists, their camel milk and camel milk products to be offered to eager travelers, including the Gen Z and Millennial travelers who spend a fair portion of their income on travel experiences.

Additionally, offering camel milk for iftar and suhoor during Ramadan would offer a nutritious food that offers the “hunger-quenching” result that Bedouins and others often attribute to camel milk. Scientifically, the role of insulin and

proteins in camel milk could be further examined for suitability for Ramadan meals. This also offers a marketing opportunity, especially if sold alongside nicely packaged dates as a holiday or Eid gift.

In line with United Nations Sustainable Development Goals (SDGs), camel milk production and related tourism experiences offered in a sustainable manner may benefit pastoralist camel communities in arid countries, as well as those in more verdant places (many of whom are Muslim). Milk income tends to benefit families, women, children and rural villages. Currently, preserving the quality of fresh camel milk in liquid, powdered, and other forms like cheese is a challenge that is being met but has room for improvement. Various pasteurization, freezing, drying and packaging methods are successfully being used but wider distribution and the import-export process is a challenge. Moving the milk from rural farms or pastoralist regions with adequate cold chain storage is sometimes difficult. Since most of the camel milk in the world is at present consumed by the producers in remote areas, efforts to increase commercial milking techniques, packaging and transportation have been undertaken by a few large farms, small scale farms or start-ups and NGOS (Nagy et al., 2022). Universities have begun supportive processes such as ice cream making, hosting pastoralist education workshops, and conducting genetic and field research into identifying high milk-producing camel breeds. Increasing the supply of camels is also a challenge as they have a single offspring and the gestation period is around 13 months. This also leads to slow scaling of dairies for investment returns, especially in countries like the US with limited stock and strict importation laws. Yet enhancing the fertility of camels by embryo transplant is well underway in the Middle East, and some countries do import camels regularly. Other countries with substantial camel populations such as Mongolia and Kazakhstan are increasing their production chain, yet face challenges of finance, distance to market and limited supply to date. Selling camel milk, an

⁶ Kazakhstan's camel milk powder hits Chinese market despite COVID-19. June 7, 2020

<https://www.chinadaily.com.cn/a/202007/06/WS5f0288dda310834817257656.html>

⁷ Camel Milk Becoming Popular in the US Market. June 21, 2018. <https://xtalks.com/camel-milk-becoming-popular-in-the-us-market-1394/>

ancient food often given to the sick for free, is a new concept to many such rural cultures. Yet it is coming to be embraced. Additionally, the milk can be expensive, with a pint selling for around \$10 USD to \$28 USD in the US. Educating the consumer on the value of the milk is an important goal for producers.

Conclusions

The cultural pride evident in the modern use of traditional foods like dates and camel milk is growing among Muslim consumers. Recent developments may indicate that the halal market could explore adopting camel milk for their dairy, supplement (powdered camel milk capsules, for example) and beauty product lines (camel milk soaps and lotions). Additionally, the halal food and beverage sectors may benefit from increasing offerings such as camel milk ice cream, chocolates, milkshakes and smoothies, baked goods, camel milk teas, mocktails, and further explore innovative concoctions created by chefs and culinary experts.

Some camel dairy producers may wish to cross over into tourism opportunities as an opportunity to reach the halal market while highlighting the importance of camel milk as a cultural, faith-based and healthy food. Additionally, many non dairy-producing camel owners could develop, produce or simply retail others' camel dairy products to halal tourists, as well as other visitors.

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Prethodno saopštenje

PODACI O RADU SAŽETAK

Ključne riječi:

*Kamilje Mlijeko,
Autizam, Islamska
Ekonomija, Halal
Muslimanski
Potrošač.*

Dok je kamilje mlijeko odavno održiva tradicionalna hrana u suhim područjima i pašnjacima, sve se više koristi od strane ljudi koji nisu pastiri u velikim američkim i drugim globalnim gradovima. Istraživanje je provedeno kako bi se utvrdile trenutne prakse uzgajivača kamila i dionika u proizvodnji kamiljeg mlijeka, posebno proizvođača mlijeka u SAD-u i suhim zemljama. Metode su uključivale direktnu komunikaciju s proizvođačima mlijeka, potrošačima, pastirima, znanstvenicima, liječnicima, trgovcima i podacima s društvenih medija. Pregledi literature, posjete farmama i konferencije provedene su u svrhu uspostavljanja nekih parametara trenutnog tržišta kamiljeg mlijeka kako bi se pružila osnova za halal potrošače kamiljeg mlijeka, te sekundarno istražiti potencijal tržišta kamiljeg turizma. Različite vrste proizvoda od kamiljeg mlijeka u SAD-u utvrđene su kao svježije sirovo mlijeko, mlijeko u bočicama i flash-pasterizirano tekuće mlijeko, zamrznuto tekuće mlijeko istih vrsta i uvozni prah mlijeka koji je ili prskanim sušenjem ili smrzavanjem sušen. Slični proizvodi dostupni su u suhim zemljama s obiljem kamila. Različite metode za zatvaranje prodaje, dostavljanje i stvaranje adekvatnih metoda za očuvanje mlijeka nalaze se u svim operacijama mliječnih kamila. Trendovi za kamilje mlijeko su uzlazni unatoč uobičajenim izazovima, jer upotreba kamiljeg mlijeka raste među potrošačima. Halal potrošači predstavljaju obećavajuće i uglavnom neiskorišćeno tržište za ovu halal hranu zbog zahtjeva za zdravljem, kulturnog ponosa i prilika za halal turizam.
