

# Online camel milk trade: new players, new markets (Update)\*

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## Keywords

Camel milk, consumption, exports, international trade, electronic commerce

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## Summary

The rapid growth of the dromedary and Bactrian camel population worldwide aims in part at satisfying a growing demand for camel milk. We analyze these changes by studying the recent arrival of online trade of camel milk products. This study highlights the emergence of actors involved in the intensive production of camel milk, but also in the trade of milk powder, fermented milk and cheese. These new camel milk entrepreneurs are located for the most part in countries without camel farms, notably in Europe, the United States, Canada and several emerging countries. The prices of milk sold over the Internet are extremely variable, highlighting a market that is under construction. The emergence of this trade reflects a dualistic innovation process. This entrepreneurial dairy economy based on exchanges between intensive livestock farms and distant consumers sharply contrasts with a local dairy economy based on periurban trade in fresh milk, which is strongly correlated with pastoral systems. We conclude with research and development recommendations to make the online trade of camel milk more inclusive.

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## ■ INTRODUCTION

For a little more than two decades, there has been a growing interest in camel production, which has led in particular to the rapid growth of the camel herd in several countries. The growth rate of the camel herd worldwide thus exceeds that of other species of domestic herbivores, except for the goat (Faye, 2020). Some people even mention a real enthusiasm for camel products (Faye, 2018a) that can be associated with three main factors. Firstly, climate change, which is evidenced by an increase in rainfall irregularities and by the aridification of some environments, has resulted in an expansion of camel breeding areas, particularly in the semi-arid regions of Africa (Jones and Thornton, 2009; Faye et al., 2012). Secondly, the growing integration of livestock into the market economy has enabled the gradual development of camel products trade, particularly camel milk. Merchandizing camel products has been based on the development of milk collecting systems and processing units that sell various types of dairy products on local, regional and even international markets

(Faye, 2016). And thirdly, camel products (milk, meat or wool) are credited with dietary and medicinal virtues, real or supposed, which motivate their consumption for food and non-food uses (cosmetics, clothing) (Yadav et al., 2015).

To understand the dynamics of this new interest in camel breeding and its products, this article focuses on the online camel milk trade. Indeed, the consumption of camel milk is experiencing an unprecedented boom in many countries. Whereas until recently it remained limited to self-consumption on farms, there is today a rapid increase in sales to urban areas (Sraïri et al., 2019). However, because of the distance of consumers from production areas, the actors of this new trade have been resorting for several years to Internet sales. After reviewing the developments in the production and consumption of camel milk worldwide, we analyze these innovations by proposing a precise description of the marketed products, their production conditions, as well as a systematic study of the websites involved in the online trade.

## ■ CAMEL MILK: A RAPIDLY EXPANDING PRODUCTION

The actual production of camel milk on a global scale is very poorly known for many reasons: low market integration until recently, remoteness of production areas with difficult access to consumption areas, low percentage of processed products, and above all importance

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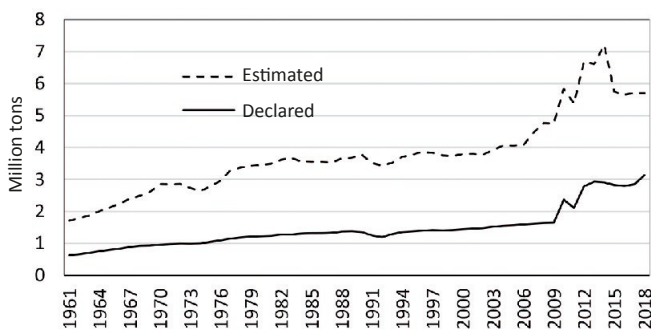
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of self-consumption. The self-consumed part indeed largely prevails although it is difficult to quantify it. Even in Saudi Arabia, where the sector is experiencing some structuring, the share of milk produced in the Bedouin system that is entirely unintegrated into the dairy market represented, according to an estimate in the north of the country, 62% of camel milk and, of the sample of farms monitored in this study, only 13% supplied the market (Faye et al., 2014a).

The share of self-consumed milk is probably higher in countries where camel farming areas are very distant from urban centers (e.g. Sahelian countries) and less so in smaller countries with good road and logistics infrastructure (e.g. Gulf countries). In any case, in spite of the lack of data, self-consumption of camel milk is widespread. Extensive pastoral livestock systems do not lend themselves well to the economic enhancement of camel milk.

Food and Agriculture Organization (FAO) of the United Nations statistics show a world production of 3.15 million tons of milk in 2020, which, given what is reported above, appears to be greatly underestimated. Based on the FAO's reference alone, camel milk represents only 0.37% of the milk consumed in the world, which makes it yet a marginal product, even if this proportion has doubled since 1961 (0.18%). Moreover, with 23% of she-camels devoted to milk production, these species appear to be more commonly bred for this type of speculation than cows, of which only 18% are devoted to milk production (FAOstat, 2022). Based on this proportion and considering the world population of large camelids estimated at 38.5 million (FAOstat, 2022; Faye, 2021), there would be almost nine million milking camels in the world, of which about half (4.5 million) would be lactating, the cycle of the camel being two years on average. Based on an average of about 1500 liters of milk per lactation (Faye, 2004; Abdalla et al., 2015), i.e. roughly four liters per day, the annual world production can be estimated at 6.6 million tons of camel milk (Figure 1).



**Figure 1:** Camel milk production (× 1000 t) in the 48 countries officially reporting camel livestock in FAOstat database, 1961–2018 // Production de lait de chamelle (× 1000 t) dans les 48 pays déclarant officiellement un cheptel camelin dans la base FAOstat, 1961–2018

These estimates are still well behind the quantities produced by other dairy species on a global scale. However, if we refer only to countries officially declaring a camel herd (48 countries listed), the share of camel milk production is higher than that of ewes. The share of camel milk in production by country varies from 0.001% (Russia) to 44.6% (Somalia), and even 60% in Western Sahara, an area included in the Saharan provinces of Morocco by the FAO since 2019 (Figure 2).

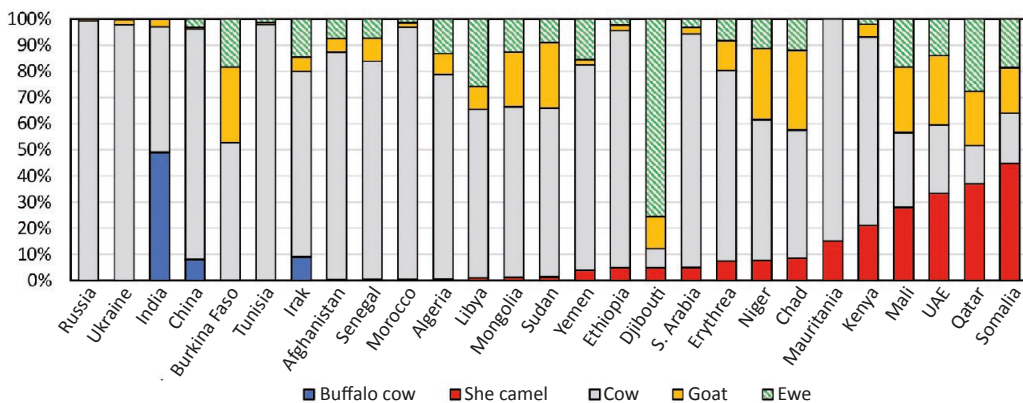
Overall, camel milk production in the world, as estimated by the FAO, has increased fivefold since 1962. This surge corresponds to an annual growth rate of 7%, more than double the growth rate of cow milk, and more than triple the growth rate of small ruminant milk (FAOstat, 2022).

One of the major changes in camel milk production in recent decades is the emergence of intensive dairy farming systems characterized by an end to herd mobility (Chamekh et al., 2020). Central Asian countries in the Soviet era and now Gulf countries have been pioneers in this field. Dairy intensification in the camel industry involves the possibility of raising camels for production in the same way as dairy cows by using all the practices that have led to unprecedented dairy development in the Western world: use of reproductive biotechnology (artificial insemination, embryo transfer), machine milking, disease prevention, rational feeding, sedentarization, performance control, and genetic selection (Faye, 2018a; 2018c).

However, if the camel production potential can be easily compared to that of zebus raised in tropical areas, it is lower than that of selected dairy cows because of a reproductive cycle twice as long, the unsuitability of milking machines used in cattle breeding, and more specific feeding needs (Nagy et al., 2015; Ayadi et al., 2018; Faye, 2016). As a result, the production costs of camel milk in intensive farms are high and the economic result of an intensive camel farm can only be profitable with a high milk selling price. This is currently largely the case since in most producing countries camel milk is marketed at a price two to three times, or more, higher than that of cow milk (Faye et al., 2014b). In the absence of adequate genetic selection and development of reproductive biotechnologies outside of research stations (Faye, 2018b), the increase in dairy performance will remain limited to the selection of the best few dairy camels on intensive farms despite recent breakthroughs in the knowledge of the genetic potential of the species (Al-Abri and Faye, 2019; Burger et al., 2019).

■ CONSUMPTION ACROSS THE WORLD

The consumption of camel milk per inhabitant per year is difficult to estimate given the considerable proportion of milk consumed by pastoral populations. For example, in a survey conducted in the outskirts of N'Djamena (Chad), Koussou (2008) reported that the share of camel milk consumed by households varies from 1.7 to 30% of available milk, with an average of 7.4%. These are households that are



**Figure 2:** Proportions of milk from different species in the 28 countries reporting national camel milk production (calculated from estimated or reported productivity data by country in 2019; FAOstat, 2021) // Proportions de lait des différentes espèces dans les 28 pays déclarant une production nationale de lait de chamelle (calculées d'après les données de productivité estimées ou déclarées par pays en 2019 ; FAOstat, 2021)

seasonally established around the capital and are therefore integrated into the urban market. Self-consumption is much more prevalent in areas that are far from consumption basins.

As a first estimate and based on the human population recorded in FAOstat, the consumption in camel-milk producing countries would have varied from 0.40 liter/capita/year in 1961 to 0.82 liter/capita/year in 2020, i.e. a slight increase with very contrasted results depending on the country. In most concerned countries and not just in the highly populated ones mentioned above, consumption is often limited to certain regions. This is particularly the case in Maghreb countries where camel milk is a product of Southern regions, but also in some Sahelian countries where camel milk is consumed only or nearly only in Saharan areas (Mali, Niger) or in arid lowlands (Ethiopia, Kenya). Consequently, calculating an average per capita consumption based on the entire population grossly underestimates the role of camel milk in the consumption of dryland households, especially since human population growth is lower in drylands. Unfortunately, little data is available on the subject. For example, in pastoral areas of Kenya, a study of 202 households shows that camel milk accounts on average for about 20% of total household food expenditures, with over 60% of households reporting consuming camel milk (Elhadi et al., 2015). Important seasonal variability is observed, with expenditures for camel milk ranging from 14% in the rainy season to 28% in the dry season. In terms of quantity, this represents two liters per day per household in the rainy season, and 2.5 liters in the dry season, which is more than twice that of cow milk on a yearly basis. The average household size being six persons, consumption reaches about 135 liters/capita/year, i.e. a much higher proportion than the national average.

Moreover, it should be noted that camel milk consumption is not limited to producing countries, but it is also present in Northern countries. A trade is gradually emerging, even if it does not appear in customs statistics nor in FAO data. A few years ago, it could be stated that camel milk was the focus only of a local or sometimes national market, as there was no international market (Faye and Konuspayeva, 2012). This is no longer the case today. Merchandizing camel milk, as mentioned above, has in fact allowed this product to develop on a larger scale, especially in urban areas, either through informal channels by selling milk directly from periurban farms (Koussou et al., 2012), or through formal channels after processing in dairies and selling via distributor networks including supermarkets. The introduction of camel milk on the market has resulted in two main changes: (i) the diversification of the products offered and (ii) the globalization of its sale. Product diversification will be discussed in another publication. In the present study, we were interested in the sales of camel dairy products by Internet.

### ■ ONLINE TRADE

Reserved for a long time as a gift to a passing guest or for the needs of the extended family or the encampment, camel milk remained for a long time outside of commercial transactions. In many pastoral societies, selling was a taboo and has long been an obstacle to the emergence of a local trade (Abeiderrahmane, 1997). Ongoing changes in both camel production systems (Faye, 2018c) and urbanization have led to the emergence of a camel milk market (Faye and Konuspayeva, 2017). Initially limited to local sales, this trade has recently been internationalized with the development of camel milk powder. This long-distance trade has understandably benefited from the growth of new possibilities offered by online trade.

In 2022, there were two major camel milk powder resale platforms (Ali-Baba and Amazon) and a large number of other specialized resale sites. Ali-Baba, the Chinese platform, offers a very wide range of products, some of which can be found in Table I, although it is far from exhaustive (33 out of 138 listed on Ali-Baba's website).

One observes that the prices per kilogram vary greatly, with powder varying from 0.1 to 330 USD, and an average of 1 USD per kilogram per ton purchased. Such variability can be attributed to (i) sales units (the packaging unit for wholesale bulk milk is usually a 25-kg bag, but packaging is also highly variable for retail, as shown by the different origins of suppliers; Figure 3), and (ii) the quality of the product sold and the reliability of its origin.

It should be noted that the suppliers are not necessarily the producers, most of them being only resellers. Specialized online sales sites offer more diversified products in lower volume units. This is the case of Desert Farms in the United States, which offers products from US and European dairy camel farms (Table II).

In France, the [www.camel-idee.com/](http://www.camel-idee.com/) website also offers a range of products such as health-enhancing foods at higher prices than competitors (Table III), with the origin of milk mainly from the farm in Dubai.

In the Netherlands, Mr. Smits' dairy camel farm also proposes its own camel milk products to the European network via its e-commerce

**Table I:** List of some camel milk suppliers on Ali-Baba sales platform (China) ([www.alibaba.com/trade/](http://www.alibaba.com/trade/)) /// Liste de quelques fournisseurs de lait de chamelle sur la plate-forme de vente Ali-Baba (Chine) ([www.alibaba.com/trade/](http://www.alibaba.com/trade/))

Supplier	Country	Packaging type	Price (USD/unit)
Shree Krishna Enterprise	India	1 kg	10-15/kg
Shop Globally LLC	Georgia	200 g	100/kg
Eurasia Invest Ltd LLP	Kazakhstan	1 kg	125/kg
Camel'Idée	France	100 g	250/kg
Xi'an Silk Road Dairy Co Ltd	China	330 g	330/kg
Tristan Morris	Canada	25 kg	200/t
Avenorte Avicola Ltda	Brazil	25 kg	350/t
INT Exporter Pty Ltd	United Kingdom	25 kg	500/t
Europe Distributor Pty Ltd	Finland	200 g	600/t
Refiwe Imp.& Exp.	South Africa	25 kg	700/t
Spinel Co.	Thailand	25 kg	1200/t
Agrosul Agroavicola Ind.	Brazil	24 kg	100-1000/t
Sam speed Imp.Exp. Sasu	France	25 kg	150-1800/t
Eldos Hijos Food House	Philippines	25 kg	350-400/t
SARL De Canolle	France	25 kg	400-700/t
Safeway Agro LLC	Ukraine	25 kg	400-450/t
Morgan's Choice	Canada	50 kg	437-835/t
Rotur Lawncare Service	Canada	25 kg	450-550/t
Trilium group	Canada	25 kg	450-600/t
United SA Agri supplied	South Africa	25 kg	500-700/t
Globe Exp Imp Pty Ltd	Germany	25 kg	600-800/t
HBK90 Ltd	United Kingdom	25 kg	730-920/t
Global Trade Impex Ltd	United Kingdom	25 kg	800-1200/t
Donovan Exp. Co. Ltd	Thailand	2 kg	800-1200/t
Wamenya Trading	Netherlands	25 kg	850-900/t
Carl Marketing	Canada	20 kg	950-2000/t
Baba Thai Group	Thailand	2 kg	1000-1500/t
Tatian NSAN	Thailand	25 kg	1200-2500/t
C&M International LLC	United States	5 kg	1350-1450/t
MHS TJYSK Group LLC	United States	6 kg	1350-1400/t



**Figure 3:** A few packages of camel milk powder and suppliers' names on Ali-Baba online sales site (China) /// Quelques emballages de lait en poudre de chamelle et nom des fournisseurs sur le site de vente en ligne Ali-Baba (Chine)

website [www.oasismilk.com/fr/camel-milk-powder-and-capsules/](http://www.oasismilk.com/fr/camel-milk-powder-and-capsules/) (Table IV).

In Paris, the Chamelait company (United Arab Emirati origin) also sells camel milk powder in 100-g packages at 19.99 EUR, i.e. nearly 200 EUR/kg (<https://fr-fr.facebook.com/chamelait>). Canada and India comprise the largest number of camel milk powder suppliers

**Table II:** Food products made from camel milk available at <https://desertfarms.com/collections/camelmilk> /// Produits alimentaires à base de lait de chamelle proposés sur le site <https://desertfarms.com/collections/camelmilk>

Product	Unit	Price (USD)	Price (USD/kg)	Price (USD/kg ME*)
Fresh milk	16 oz	18	40.5	40.5
Fresh milk	8 oz	10	45	45
Frozen milk	16 oz	18	40.5	40.5
Frozen milk	8 oz	10	45	45
Frozen Kefir	16 oz	17	38.1	38.1
Milk powder	420 g	120	285.7	34.4
Milk powder	200 g	74	375	45.1

\* ME: milk equivalent; 1 kg milk powder = 8.3 kg ME /// \* ME : équivalent lait ; 1 kg lait en poudre = 8,3 kg ME

**Table III:** Products available on the Camel'Idée online shop in France /// Produits proposés sur le site de vente en ligne Camel'Idée en France

Product	Unit	Price (EUR)	Price (EUR/kg)	Price (EUR/kg ME*)
Milk powder	100 g	19.5	195	23.40
Raw or frozen milk	7 × 500 ml	67.5	19.2	19.20
Milk powder	5 × 10 g	12	240	28.90
Milk powder	100 g	22.5	225	27.10
Pasteurized milk	235 ml	5	21.2	21.20

\* ME: milk equivalent; 1 kg milk powder = 8.3 kg ME /// \*\* ME : équivalent lait ; 1 kg lait en poudre = 8,3 kg ME

with 26 and 20 companies involved, respectively. Among the other suppliers, the largest number of companies are located in Germany, Thailand, Austria and Hungary.

One notes that with the exception of India, China, the United Arab Emirates, Kazakhstan and Australia, most suppliers/resellers are located in countries without camel breeding (European countries, United States). Among the suppliers of camel products, there is a Moroccan company, Prodigia Sarl, but it only markets traditional cosmetic products including camel milk soaps.

Few suppliers are currently likely to market camel milk powder in Europe. Except for milk produced in Europe by Mr. Smits' farm in the Netherlands ([www.kamelenmelk.nl](http://www.kamelenmelk.nl)) and the United States farms delivering their products on the Desert Farms site, to our knowledge only the Camelicious farm in Dubai was able to obtain European Union authorization to export its milk to Europe after a process of several years involving not only the production but also all state control systems (Nagy et al., 2014). Whereas the number of suppliers/resellers of camel products is fairly large at global level, the number of producers/processors on the international market seems to be limited; hereafter we provide a fairly complete list.

Camelicious (<http://camelicious.ae/product-category/premium-long-life-camel-milk/>): One of the world's largest dairy camel farms (over 6000 animals in 2021), it is based in Dubai. Established in 2006, the farm today produces more than two million liters of milk

**Table IV:** Products available on the online sales site of Mr. Smits' farm in the Netherlands /// Produits proposés sur le site de vente en ligne de la ferme de M. Smits aux Pays-Bas

Product	Unit	Price (EUR)	Price (EUR/kg)	Price (EUR/kg ME*)
Milk powder	425 g	65	153	18.40
Capsules of milk powder	60 g	10.5	175	21.10
Pasteurized milk	7 × 500 ml	49.5	14.1	14.1

\* ME: milk equivalent; 1 kg milk powder = 8.3 kg ME /// \* ME : équivalent lait ; 1 kg lait en poudre = 8,3 kg ME

per year (Nagy et al., 2013). Its production is transformed *in situ* into products including milk powder. The farm is certified for export to Europe and its products are very present on the European market, but also in Saudi Arabia, the United States, Russia, China, and Malaysia.



**Daulet-Beket Farm:** This large farm, established in 2003 in Kazakhstan about 145 kilometers from Almaty, owns over 6000 camels (dromedary and Bactrian) and produces traditional fermented camel milk (*shubat*), camel milk candy (*balkaimak*), traditional cheese (*qurt*) for the national market, but also the regional markets in the form of drinkable yogurt for Russia. Recently in 2020, camel milk powder (Sydyk™) production has begun and sales to national and Chinese markets were launched in 2021 (Konuspayeva et al., 2022).



**QCamel** (<https://qcamel.com.au/>): This Australian supplier located in Queensland has a camel farm run by the Brisbane family, founders of the Australian Camel Industry Association. Established in 2006, the dairy farm went on to develop its own operation. Accredited in 2014, it produced the first pasteurized camel milk in Australia. Today, QCamel also produces smoothies, yoghurts, powders, bipowders and cosmetics. These products are sold to over 80 retailers across Australia and exported to New Zealand and Singapore.



**Vital Camel Milk** ([www.vitalcamel.com/](http://www.vitalcamel.com/)): One of the few African suppliers and one of the first camel milk dairies (except for Tiviski in Mauritania). The dairy started its processing operation in Nanyuki, Kenya, in June 2005. It produces pasteurized milk, fermented milk (*susa*), yoghurt drinks and ice cream. The products are available in supermarkets and stores in Nairobi and major cities. The company also exports to South Africa. The camel milk industry in Kenya is characterized by its dynamism and involvement in local development.



**Desert Farms** (<https://desertfarms.com/>): Launched by a Saudi who emigrated to the United States, then developed by the Amish community, this initiative was subsequently based on milk processing by eight family farms in different states of the country (Missouri, Ohio, Indiana and Pennsylvania). This supplier sells online fresh, pasteurized, frozen milk or milk powder throughout North America. The initiative also includes five European farms (in Sweden, Germany, Netherlands and Switzerland) that provide part of the supply on the European Continent. These farms are not necessarily milk producers, but they are above all resale places for the milk of the European network and in particular of the Smits farm in The Netherlands.



**Aadvik Foods** (<https://aadvikfoods.com/>): Camel milk has been processed in this dairy directly from camel breeders in the states of Gujarat and Rajasthan in India since 2016. It provides its services to more than 200,000 regular customers in the country. The line includes milk powder in different packages, frozen milk, milk chocolate and various cosmetic products. Their market is mainly national, but part of the milk powder is exported to China.

**Camel Milk Co.** ([www.thecamelmilkco.com/all-products](http://www.thecamelmilkco.com/all-products)): This recently founded (2015) United States company is based in Colorado and sells on its website mainly frozen milk (in different volumes) and camel milk soap. However, its sales network is limited to the national level.



**UK Camel Milk Co.** ([www.ukcamelmilk.co.uk/](http://www.ukcamelmilk.co.uk/)): Founded in 2013, the company's main focus is the supply of camel milk and camel products to the United Kingdom and the rest of the world. The products offered include freshly frozen raw milk, milk powder, capsules, soaps and creams. All these products actually come from the Smits farm in the Netherlands.



**Camel Dairy Farm Smits:** This is thus a Dutch camel dairy farm located in the village of Berlicum near Hertogenbosch. It includes about 80 camels imported from the Canary Islands of which about 25 are milked, providing about 175 liters of milk per day. It is part of the Desert Farms network. Frank Smits founded the company in 2006. It is the first large-scale camel dairy farm in Europe. In addition to sales on the Dutch domestic market, camel milk is exported to the United Kingdom (UK Camel Milk Co.), Belgium, Germany, Austria, France and Sweden.

A new large camel dairy farm, La camellerie, settled by Julien Job in the north of France, got its agreement in 2022 to sell pasteurized, fermented camel milk and camel milk cheese.



**Xinjiang Wangyuan Camel Milk:** This major Chinese group based in Xinjiang offers a wide range of food products on the national market, including camel milk products – powder and liquid milk. A large part of the group's activity is directed toward the production of infant foods containing camel milk. Their products are present on the Chinese market and the company is one of the main suppliers of the Ali-Baba platform.

#### ■ WHAT PROSPECTS FOR THE DEVELOPMENT OF THIS MARKET?

Many uncertainties remain regarding the international dynamics of camel milk trade. There is probably a significant discrepancy between the volumes apparently available on the Ali-Baba online sales site (particularly for milk powder) and the actual number of players identified on the export market. A quick estimate suggests that the international market potential, based on current suppliers, would not exceed 8500 tons of camel milk per year, which in theory represents barely 0.3% of the world production potential. Overall, the share of camel milk available on the export market is therefore very low compared with the 9% of cow milk traded internationally. This shows the considerable potential for progress for this product, even if it can never become a substitute for cow milk.

These promising prospects for camel milk international trade are underlined in some experts' reports. One of them (Global Camel Milk Powder Market 2019, [www.absolutereports.com/global-camel-milk-powder-market-14901992](http://www.absolutereports.com/global-camel-milk-powder-market-14901992)) estimates the annual growth rate of this market at 3.9% between 2011 and 2018. The same report estimates that the market could grow at an annual rate of 8% for the period 2019–2024. In this context, growth as in many other agricultural sectors is driven by the Chinese market. The same report estimates the Chinese camel milk powder market to be 99.56 million USD in 2019 and to reach possibly 189.36 million USD by 2027, growing at a rate of 8.4% from 2020. Europe, however, is not left behind. According to the same source, the value of the camel milk powder market would have reached 445.04 million USD in 2019 and, with an annual growth of 9%, could reach 881.36 million USD in 2027. The leading European countries are Germany (19.0% of the market in value in 2019), France (15.9%), Great Britain (13.9%),

Russia (9%) and Italy (7%). This share is expected to remain stable over the period 2020–2027. The other European countries involved in this market are, in order of importance, Austria, Poland, Portugal, Spain, Turkey (where a camel milk sector is emerging), the Netherlands, Ireland, Denmark and Belgium.

International trade appears to be strongly supported by the health benefits attributed to camel milk, although there are very few market studies to validate this hypothesis. The enthusiasm of some consumers for this milk is reflected in its price, which is significantly higher than that of cow milk. It does not in any way constitute a substitute milk. Its price and volume of production restrict it to a niche production, which can be explained by high production costs, still underdeveloped consumption, and the absence of international standards.

We feel there are three essential elements to take into account to explain the growth of the camel milk market: (i) the richness and originality of the milk composition, which are commercial advantages for consumers, (ii) the diversified offer of processed products (flavored milk, *laban*, cheese, ice cream, yoghurt, whole and skimmed milk powder, infant formula, cosmetic products), and (iii) the high diversity of commercial channels used to market these products (supermarkets and medium-sized stores, specialized stores, networks of 'nature' or 'wellness' stores, online trade, etc.). In fact, the Covid-19 pandemic has boosted sales in several regions. On the evidence that camelid immunoglobulins allow the development of therapeutic antibodies (Dong et al., 2020), several experts have suggested the potential effect of camel milk to increase anti-Covid-19 immunity. This new commercial argument has resulted in a significant increase in demand and price of camel milk in some countries such as Kazakhstan (Nagy et al., 2020). This enthusiasm for the possible immunostimulant properties of this milk has also increased the volume of exports (Anon., 2019). Thus, the Chinese demand for camel milk produced in Kazakhstan increased by 20% during the health crisis ([www.china-daily.com.cn/a/202007/06/WS5f0288dda310834817257656\\_3.html](http://www.china-daily.com.cn/a/202007/06/WS5f0288dda310834817257656_3.html)).

## ■ CONCLUSION

The analysis of online camel-milk sales sites highlights the emergence of new actors investing in the camel milk sector. Although nomadic pastoral livestock production remains dominant in most livestock countries, our study highlights the emergence of new entrepreneurs who are investing in more intensive livestock production, and who are taking over trade and processing of processed products. Most new camel milk entrepreneurs settled in countries without camel farms, particularly in Europe, the United States, Canada and several emerging countries (Brazil, China, South Africa).

The dynamics of the online camel milk trade thus reflect a dual innovation dynamic. On one hand, the emergence of intensive production units targeting a long-distance market reflects the emergence of an entrepreneurial economy. This economy, which relies in particular on online sales, appears relatively disconnected from pastoral dynamics; the result of new private investments is what makes it possible to meet a new urban demand. This form of extraterritorial camel economy testifies to the search by consumers for new identity-based, health-enhancing, sustainable or functional products. On the other hand, the development of periurban dairy production workshops participates in the development of a local camel economy. Pastoralists, who practice grouping of females and improve feeding practices marginally, initiate these workshops. These locally based sales, limited to towns near pastoral areas, are giving rise to the emergence of a much more inclusive economy, i.e. one that is highly correlated with family farms and pastoral territories (Duteurtre, 2019).

Because of its qualities, the dairy camel is a pastoral wealth and has thus become a productive capital mobilized by the actors of the digital economy. This new perspective emphasizes that the technical and economic dimensions of trade in livestock products are coupled with more social and even sociopolitical dimensions that must be addressed (Duteurtre and Faye, 2009).

The development of this dual economy raises new research questions. It involves a better understanding of the characteristics of camel milk from the more intensified systems, and their health and nutritional properties. The emergence of this new trade also raises the need for regulation to control sales in markets where there are no quality standards. Entrepreneurs also face many technical constraints in developing new dairy products. Moreover, it involves assessing the impacts of new private investments in the sector on commercial prospects for pastoralists. Development of the camel sector indeed raises the issue of its impact on poverty reduction. It is urgent to identify strategies and development programs to make this new entrepreneurial economy more inclusive.

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## Author contributions statement

GK and BF collected the data, processed the information, and co-wrote the article. GD supervised the project and contributed to the final writing.

## Conflicts of interest

The study was conducted with no conflict of interest.

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## Résumé

**Konuspayeva G., Faye B., Duteurtre G.** Commerce en ligne du lait de chamelle : nouveaux acteurs, nouveaux marchés (Actualisation)

La croissance rapide du cheptel mondial de dromadaires et de chameaux vise notamment à répondre à une demande croissante en lait de chamelle. Nous analysons ces mutations en étudiant le commerce en ligne, apparu récemment, de produits issus de lait de chamelle. Cette étude souligne l'émergence d'acteurs investis dans la production intensive de lait de chamelle, mais aussi dans le commerce de lait en poudre, de lait fermenté et de fromages. Ces nouveaux entrepreneurs du lait de chamelle sont implantés pour une bonne partie dans des pays dépourvus d'élevages camelins, notamment en Europe, aux Etats-Unis, au Canada et dans plusieurs pays émergents. Les prix du lait vendu par internet sont extrêmement variables, soulignant que ce marché est en cours de construction. L'émergence de ce commerce reflète une dynamique d'innovation duale. A cette économie laitière entrepreneuriale basée sur des échanges entre des fermes d'élevage intensif et des consommateurs éloignés s'oppose en effet une économie laitière de proximité basée sur le commerce périurbain de lait frais fortement corrélé aux systèmes pastoraux. Nous concluons sur des pistes de recherche et de développement pour rendre le commerce numérique de lait de chamelle plus inclusif.

**Mots-clés :** lait de chamelle consommation, exportation, commerce international, commerce électronique

## Resumen

**Konuspayeva G., Faye B., Duteurtre G.** Comercio en línea de leche de camella: nuevos actores, nuevos mercados (Actualización)

El crecimiento rápido del hato mundial de dromedarios y de camellos se enfoca principalmente hacia responder a una demanda creciente de leche de camella. Analizamos estas mutaciones mediante el estudio del comercio en línea de productos originarios de la leche de camella, de aparición reciente. Este estudio realza el surgimiento de los actores involucrados en la producción intensiva de leche de camella, así como en el comercio de leche en polvo, de leche fermentada y de quesos. Estos nuevos empresarios de leche de camella se encuentran implantados, en su mayoría, en los países desprovistos de explotaciones camelinas, sobre todo en Europa, Estados Unidos, Canadá y en varios países emergentes. Los precios de la leche vendida por internet son extremadamente variables, realizando que este mercado se encuentra en curso de construcción. El surgimiento de este comercio refleja una dinámica de innovación doble. A esta economía lechera empresarial basada sobre intercambios entre fincas de cría intensiva y de consumidores distantes, se opone en efecto una economía lechera de proximidad basada sobre el comercio periurbano de leche fresca, fuertemente relacionado a los sistemas pastoriles. Concluimos sobre las pistas de investigación y de desarrollo para hacer el comercio numérico de leche de camella más inclusivo.

**Palabras clave:** leche de camella, consumo, exportaciones, comercio internacional, comercio electrónico

