



The Marketing of Camel Milk in the Ouargla Region: Its Opportunities and Limits

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ABSTRACT

Background: Camel husbandry has the potential to mitigate part of the milk deficit in arid regions. The aim of this study is to identify the factors influencing the cost of camel milk and to analyze the barriers limiting its marketing in the Ouargla region.

Methods: A survey was conducted among 30 camel farmers. The data collected included information on the products or services required for camel breeding, the quantity of milk used for consumption and the quantity of milk sold.

Result: The study revealed the presence of producers interested in marketing camel milk, who generate notable income. An analysis of production costs indicated that feed costs dominate, accounting for 55% of the total cost of a liter of milk. The lack of a milk collection and processing facility in the area is a significant barrier to the sale of camel milk. Enhancing the management of camel milk production and the income derived from its sale requires the organization of the sector and the establishment of milk collection units and advanced processing technologies.

Key words: Arid area, Camel, Marketing, Milk cost.

INTRODUCTION

The Increasing world human population has created the issue of food security. In order to deal with this issue, there is a need to explore a new world of resources (Ahmad *et al.*, 2010). Dairy is the main branch of food industry, as like many other branches. It is a business enterprise, in which animal milk is harvested and processed. With industrialization and urbanization, the supply of milk became a commercial industry (Zirmire and Kulkarni, 2019).

The problem of Algeria's heavy reliance on dairy imports can be traced back to the early 1970s, which intensified considerably over the following two decades, particularly as Algeria transitioned toward a market economy (Chemma, 2017). This precarious situation poses a threat to food security in the country.

During the COVID-19 pandemic, when international borders were closed and global trade came to a halt, this period became critical on a global scale (Ejeromedoghene *et al.*, 2020; Rasul *et al.*, 2021). Local agricultural produce played a vital role as a readily available food source to mitigate certain shortages.

In the Saharan region, camel milk is a fundamental food item, often consumed raw throughout a significant portion of the year. In the past few decades, camel milk marketing has gained significant attention from authorities, sellers and consumers because of its nutritional value (Hadeef *et al.*, 2021) and therapeutic properties (EL-Fakharany *et al.*, 2012; Singh *et al.*, 2017; Ayoub *et al.*, 2018; Khalifa and Zakaria, 2019; Yang *et al.*, 2023). This makes it an exceptional organic food, serving as a highly beneficial addition to the food supply chain, especially in the realm of milk production, particularly within the context of addressing climate change.

Despite its significance, camel milk marketing has remained relatively limited for an extended period, primarily

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restricted to camel-breeding regions (Arain *et al.* 2023), or sales outlets located near peri-urban livestock farms. However, in recent years after the Covid-19 pandemic, the camel milk trade has experienced a period of dynamic growth.

Presently, this product is gaining traction in major urban centers across the Sahara and reaching prominent cities in the Algerian northern regions. Surprisingly, no evaluation of camel milk pricing has been conducted. Hence, it is crucial to understand the dynamics of this new trading trend and the factors that determine its cost and variability.

MATERIALS AND METHODS

Study area

Ouargla Map 1 is located in the northeast of the northern part of the Algerian Sahara (31°57'2" north, 5°19'2"), covering

an area of 163,263 km². Phoenixiculture remains the region's staple crop for decades, while cereal growing on pivots has recently been introduced. Livestock farming, particularly camel breeding, holds considerable importance alongside crop production.

Exploratory survey

The study was conducted in 2019 and pursued in the immediate aftermath of the Covid-19 pandemic, from December 2021 to November 2022. To investigate the process of producing and marketing camel milk, an exploratory survey was conducted that involved camel milk breeders and traders. A tailored questionnaire was used for each category; breeder or trader. A total of 30 farms were surveyed to address three key aspects.

Estimation of dairy costs and distribution

To calculate camel milk costs, various financial expenses such as the evaluation of costs associated with camel feed, including grazing, supplementary feed and nutritional supplements, the evaluation of transportation, healthcare, labor, milk packaging and electricity costs were considered.

Estimation of milk yield

Camel milk production estimate combines farmers and camel milk traders declarations to assess total production. Farmer interviews provide direct data on daily yields and utilization, while traders' declarations validate and complement this information. By aggregating and cross-

referencing these sources, the method ensures accurate estimates of milk production and distribution patterns.

The determination of the milk production potential of camels is predicated upon data gleaned from extant literature, revealing an average yield ranging from 1000 to 3000 liters per lactation per camel (Faye, 2004; Chamekh *et al.*, 2020).

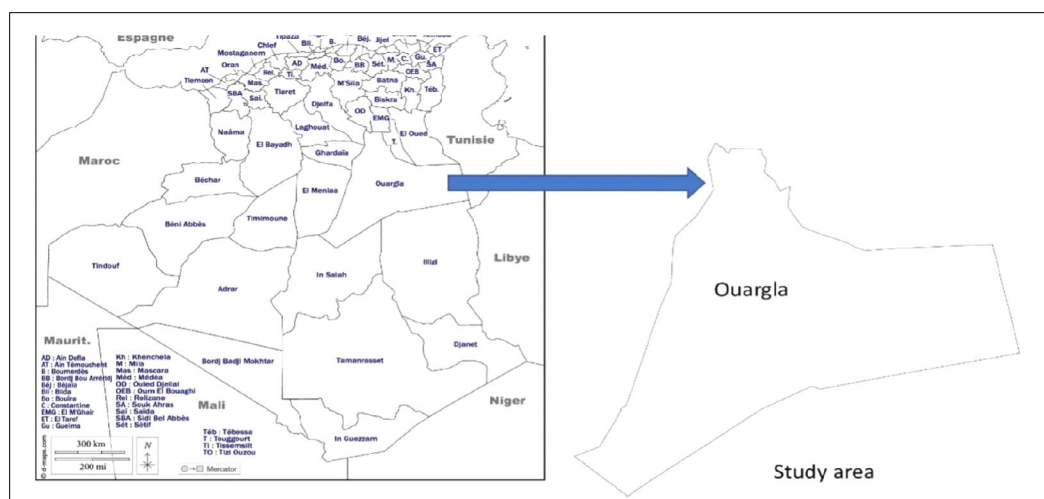
RESULTS AND DISCUSSION

Characteristics of camel farms

The herd structure plays an important role in camel management and depends on the rainy season, year and area of grazing (Farah *et al.*, 2007). As shown in Table 1, the sampling reveals that the herds are predominantly composed of female camels. Additionally, a smaller herd size was observed in the intensive system, whereas larger herd sizes were found in the extensive and semi-intensive systems. The division of the camel herd into small groups, one grazing and the other being sedentary, is a common practice in semi-intensive farming within the study area. Often the animals kept sedentary are in milk and gestating females. This helps to avoid risk associated with grazing in a herd, as well as facilitates their management, especially during heat periods and poor pasture conditions.

Milk production

The mean daily camel milk yield per farm ranges from 3.5 to 64 liters, influenced by management goals and



Map 1: Localization of the study region.

Table 1: Characteristics and structure of herds.

Herd structure	Semi-intensive system			Extensive system			Intensive system		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Herd size	21	210	70	25	340	87	18	85	57
Total females	12	153	49	15	296	64	12	50	36
Lactating females	7	50	19	5	79	35	6	34	17

Min= Minimum and Max= Maximum.

production strategies Table 2. In semi-intensive and intensive farming systems, milking is routinely performed once or twice a day. For extensive system, milking is not organized, as herders collect milk according to their visits to the pasture. Traditionally, in Ouargla, men were fully responsible for camel husbandry practices; today, women hold major responsibilities. They contribute to feeding and milking practices owing to the intensive system.

Approximately, twelve camel farmers will benefit from the sale of camel milk, especially in the semi-intensive system (65 per cent of milk sellers), due to the rapid spread of awareness of camel milk's nutritional and medicinal values. The semi-intensive production system is easier to manage as regards animal husbandry and production organization (Jaouad, 2021). It indicates that camels are playing a more increasingly significant economic role in the semi-intensive system (Shuiep *et al.*, 2014) than in extensive systems.

Contribution of the various charges to camel milk cost price

The mean cost of camel milk (pre-COVID-19) exhibits a range of 0.6 ± 0.37 USD per liter. In juxtaposition to the extant market valuation of 3.65 USD per liter, pastoralists are presently realizing a profit margin approximating 3.05 ± 0.39 USD.

Table 2: Camel milk production and marketing.

	Attribute		%
Camel milk production (Liter/Day)	≥ 10	16	53
	10-40	10	33
	40-64	4	14
Selling camel milk	Yes	12	40
	No	18	60

The structuring of production costs shows the dominance of food charges mainly barley grains (supplement used) with an average of 45 DZD, followed by labor costs with an average of 24 DZD, various charges (Packaging,) of 7.4 DZD, charges related to veterinary care of 4 DZD, transportation costs of 2 DZD and charges related to milk conservation (energy) which are the least important, with 0.002 DZD. Feeding charges constitute 55% of camel milk cost price (Fig 1) it remains one of the limiting factors of milk production. Feed prices have become extremely volatile in recent years. The recent leap in grain prices has had a major effect on the whole dairy chain due to the competitiveness of feed resources and feed costs (Alqaisi Shawabkeh *et al.*, 2011). In the absence of control over animal feed quality and quantity, which represents a major concern for breeders, in addition to the management of reproduction and health, the technical and economic control of dairy camels' feeding is an unavoidable necessity according to Laameche and Chehma (2012); to reduce the cost of breeding and therefore, ensure the sustainability of dairy camel farming.

The COVID-19 pandemic in 2020 rapidly evolved from a public health crisis into a significant global economic crisis (Lazereg *et al.*, 2020). This led to unprecedented volatility in dairy product prices worldwide.

From December 2021 to November 2022, fodder prices increased significantly by 33.83%. The price of barley, a crucial feed, rose from 2500 to 3400 DZD per quintal (equivalent to 18.25 to 24.82 USD). This upward trend in feed costs led to a noticeable increase in camel milk production costs, with the cost per liter rising to 1.05 ± 0.61 USD. Consequently, camel milk prices now range between 3.65 and 4.38 USD per liter. Despite these increased costs, pastoralists are currently realizing a profit margin of approximately 2.6 ± 0.73 USD per liter. The substantial profit

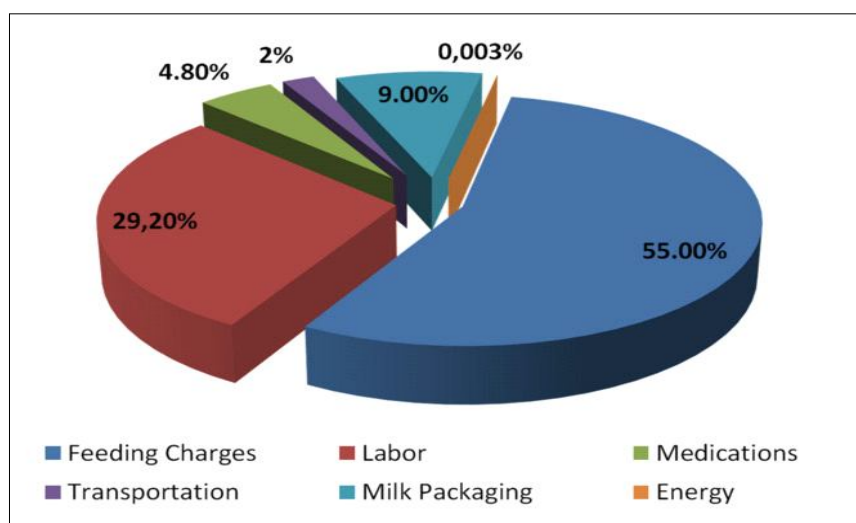


Fig 1: Production cost structure of a liter of camel milk

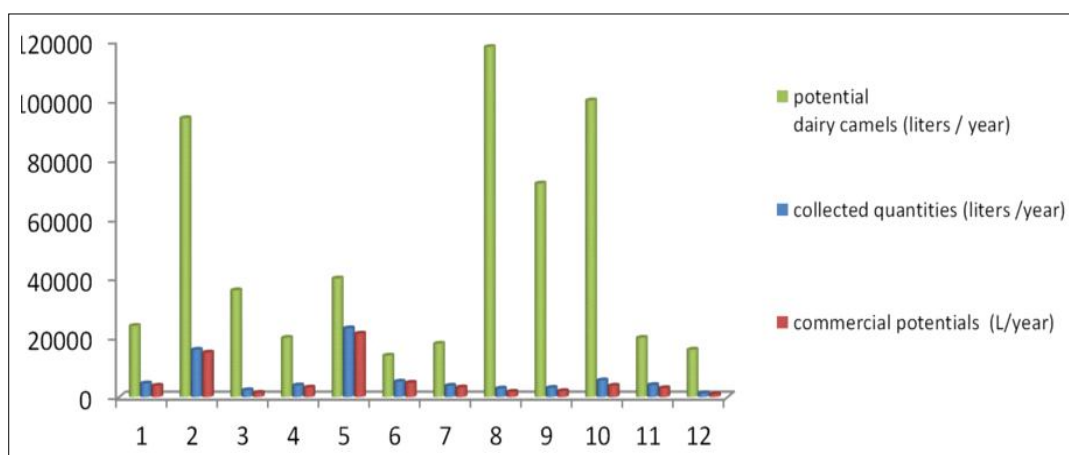


Fig 2: Milk sold and average theoretical yield of dairy camels.

margins, even after a significant increase in production costs, demonstrate the economic viability of camel milk production. This profitability can attract more investors and farmers to the sector, potentially leading to more organized and large-scale production.

It's important to note that the COVID-19 pandemic didn't have a specific impact on the camel sector when compared to other livestock industries or the broader agricultural sector. Furthermore, the COVID-19 pandemic has heightened the recognition of camel milk's value, particularly in light of the growing consumer interest in immune-boosting foods during the pandemic (Nagy *et al.*, 2021). As highlighted by Tahereh and Tanveer (2021), camel milk, known for its high lactoferrin content, particularly in powdered or tablet forms, may serve as a novel and promising candidate for preventing and treating more severe cases of COVID-19.

Dynamics of camel milk

Fig 2 shows the sales and average milk yield of dairy female camels.

The collected camel milk is primarily intended for sale, accounting for over 70% of the total collected milk. On the other hand, milk self-consumption is relatively low in our study cases, not exceeding one-third of the production. Comparing the proportion of milk sold, representing the "commercial potential," with the average milk yield of the dairy camels, representing the "milk potential of the camels," reveals that the maximum production potential of the dairy camels is underutilized. For instance, breeder number 8 has a commercial potential of only 1,800 liters per year but a high milk potential of the camels, reaching 118,000 liters per year. Conversely, breeder number 10 has a commercial potential of 3,840 liters per year and a milk potential of the camels amounting to 100,000 liters per year. This indicates that some breeders could exploit their milk production potential further. Generally, the milk sold represents only 1.5% to 18% of the milk potential of the dairy camels, except for breeders 5 and 6, reaching

53.5% and 34.5%, respectively. These quantities of milk sold are equivalent to the production potential of 2 to 10 dairy camels for herds ranging from 7 to 59 dairy camels.

These variations in milk sales can be attributed to various factors, such as:

- Distances between supply sites and consumers.
- The absence of milk collection and processing units in the study area, leads to informal milk marketing.
- Difficulties in transporting milk due to the remoteness of grazing sites. Some extensive breeders (breeders 8 and 9) sell milk to dairies in neighboring cities like Ghardaïa region for a limited period during grazing along their routes.

It is essential to note that the commercial potential of camel milk is directly related to the breeder's strategy and market opportunities. Our findings highlight the importance of optimizing the valorization of camel milk for more efficient and sustainable management of dairy camels in the study area.

CONCLUSION

The development of the camel dairy sector is a powerful tool to strengthen economic growth and provide food security. The study showed that the Ouargla region, has producers interested in the marketing of camel milk, who generate interesting monetary income. Thus, the structure of camel herds induces potential in milk production.

Popularization and advertising spots are essential tools to:

- Encourage consumption which will boost demand on camel milk.
- Sensitize camel drivers to the profitability of this activity and encourage them to sell their milk.
- Consider the organization of this sector and the promotion of camel milk by creating milk collection units and developing processing technologies.
- Master dairy camels rationing.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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