

## Dromedary milk quantitative and qualitative assessments: case study

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### ADDITIONAL KEYWORDS

Dromedary camel.  
Algeria.  
Breeding system.  
TEDJANE dairy plant.  
Milk quality.

### SUMMARY

Milk commodity is a widely consumed in Algeria, but local dairy production does not meet its demand (3.8 billion liters per year, 143L/hab/year in 2012). Camel milk is known for its very high nutritional quality; However the quantitative and qualitative performances of dairy camels are strongly influenced by the breeding systems and the procedures for its production and processing. In Algeria, camels are managed in a controlled breeding system accompanied by a shepherd or free breeding system "Hemila". It was presented in this paper as a case study a model of semi-intensive camel herd belonging to the "TEDJANE" dairy plant in south-eastern Algeria. It offers pasteurized and fermented camel milk for human consumption. We focused on the production potential of the dairy plant, the technical management, milking and milk collection, milk quality assessment, processing and conditioning, and finally the main constraints of the dairy plant and its perspectives.

### Evaluaciones cuantitativas y cualitativas de la leche de dromedario: estudio de caso

### RESUMEN

El producto lácteo es ampliamente consumido en Argelia, pero la producción láctea local no satisface su demanda (3.800 millones de litros por año, 143L/hab/año en 2012). La leche de camello es conocida por su altísima calidad nutricional; Sin embargo, los rendimientos cuantitativos y cualitativos de los camellos lecheros están fuertemente influenciados por los sistemas de cría y los procedimientos para su producción y procesamiento. En Argelia, los camellos se manejan en un sistema de cría controlado, acompañado por un pastor o sistema de cría libre "Hemila". Se presentó en este trabajo, como estudio de caso, un modelo de manada de camellos semi-intensiva perteneciente a la planta lechera "TEDJANE" en el sureste de Argelia. Ofrece leche de camello pasteurizada y fermentada para consumo humano. Nos centramos en el potencial de producción de la planta lechera, la gestión técnica, el ordeño y la recolección de leche, la evaluación de la calidad de la leche, el procesamiento y el acondicionamiento y, finalmente, las principales limitaciones de la planta lechera y sus perspectivas.

### PALABRAS CLAVE

Dromedario.  
Argelia.  
Sistema de cría.  
Planta láctea TEDJANE.  
Calidad de la leche.

### INFORMATION

Cronología del artículo.

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### INTRODUCTION

Dromedary milk is considered to be one of the most complete and the best balanced. Today, camel milk is of particular interest due to its specific composition, which has led to it being considered a high-quality raw material for young and old persons as well as for certain with special needs.

In Algeria, the camel sector is still underdeveloped; despite this, the camel population has doubled in the space of twenty years (234,170 in 2000 vs. 416,519 in 2019) (FAOSTAT 2021). This increase clearly shows the interest in camel breeding. The exploited camel

breeds are rustic and have never undergone selection for genetic improvement.

The objective of this paper is to describe dairy camel farming systems in Algerian context (advantages and limits) and to share successful experience of a camel mini dairy plant located in southern Algeria.

### DAIRY CAMEL FARMING IN ALGERIA

In Algeria, two types of camel breeding systems are prevailing: the controlled breeding system accompanied by a shepherd and the free breeding system "Hemila". The first one is largely represented by nomadic, semi-nomadic, transhumant systems and free open

stall system common to semi-intensive systems often in mixed dairy and fattening peri-urban farms. The second breeding system is traditional; the herd is left free without guarding. In general, the stockbreeders attend their herds at long periods (a few months) around fixed water points. These water points are known by the stockbreeders and the herds. The periods of frequentation are in general dependent on needs such birth, health control, etc.

The advantages of the traditional breeding system are: free movement of camel herds on large areas and good rangelands, economic efficiency (low breeding costs), high quality of dairy product (nutritional and dietetic) and ecological benefits. However, the most important disadvantages are: high risk of animal's loss (attacks of predatory, transborderly problems, steal etc.), low productivity and can cause damages to others (cultivated fields, road accidents etc.).

The semi-intensive system can increase average camel milk production by 53-61 % compared to the tradition breeding (Bakheit et al., 2015; 2016). Furthermore, intensive management (adapted milking parlor and milking frequency, early weaning), adapted daily ration, ad libitum watering and mineral supplementation preserve body condition enough at 3 of scale of 5 (Nagy et al., 2003) and increased average daily milk production, mean length of lactation and total milk production per lactation (Nagy et al. 2013)

Therefore, the main challenges in predominant extensive traditional dairy production system in Algeria include: shortage of forage and pastureland, shortage of water, security problem, access to transport, inadequate access to veterinary drugs and services, lack of improved dairy animals, unavailability of credit services, inadequate extension service, lack of knowledge and skills.

The transition to intensive dairy camel farming must involve a critical study of the zootechnical abilities of camels and of the ecological and socio-economic environment through a SWOT and PESTEL analysis of the sector, organization of the sector for the creation of a dairy basin, management of pastures and performance control and genetic improvement.

#### "TEDJANE" CAMEL DAIRY PLANT

SARL TEDJANE was created in 2016 and represents example of a growing camel dairy industry at El Oued region in the southeastern Algeria. The 34,000 female camels identified by the Department of Agricultural Services of El Oued produce an average of 2,678,000 liters of milk per year, of which 22,500 liters / year are marketed after heat treatment at the TEDJANE dairy, the rest is distributed between informal marketing or their own consumption by breeders (DSA 2019, cited by Aouachria, 2020). The dairy plant has its own camel breeding of 103 heads among which there is 40 dairy she-camels with average individual production (daily production) of 4-5 L and average lactation duration of 17 months. All animals are screened for brucellosis, tuberculosis and trypanosomiasis. the milk is collected and stored using bi-daily mechanical milking and an

isothermal tank, respectively, for a maximum of 24 hours. The milk undergoes various physicochemical (density and acidity), bacteriological (total bacteria, total coliform, staphylococcus C+, salmonella and *Listeria monocytogenes*), nutritional examinations (Protein rate) with reference to the standards indicated in the Algerian interministerial decree of 4/10/2016 (<https://www.commerce.gov.dz/telecharger/reglementation/838/article>). Furthermore, milk pasteurization is practiced at 63 et 75 °C for 15 min. the daily potential of pasteurized camel milk is 100 L. Le pasteurized and fermented milk are conditioned in 250 ml bottles and sold directly from the dairy plant or delivered to supermarkets. The mean constraints of the dairy plant are: No subsidies, production cost / price of final product, product marketing, low productivity by autochthonous camel breed, dependence on camel quality analysis.

The objective of the TEDJANE dairy plant is to attain daily productivity of 500 L. Increasing milk collection and the owned herd production are the mean perspectives. For the first one, the mean actions are: search for new camel herds to provide milk according to specific quantity/quality criteria, investment in means of locomotion for milk collection and transportation in cold, advanced collection points, intermediate collection center and contract with collectors, free training for camel herders and require state subsidies for every liter of milk collected / produced. To increase herd production, the dairy plant intend to practice milk recording for genetic improvement, improve feeding strategies and health management, manage breeding and udder health and adapt living conditions for best well-being. Finally, the dairy plant conducts market prospecting and expenses management and marking expertise (Price, quality, packaging, new product).

In the Algerian context, the average milk consumption per capita is among the highest in the world (143L/hab/year in 2012) (DRDPA 2012; El Hassani 2013). The only subsidized milk production is that of cow's milk (0.075 EUR/liter for the breeder, 0.031 EUR/liter for the collector, 0.025 EUR/liter to the dairy plant for skimmed pasteurized milk and 0.038 EUR/liter for raw milk). This makes cow's milk much more accessible at a lower price (25 DZD= 0.16 EUR for a liter of semi skimmed powdered milk and 60 DA= 0.38 EUR for cow's milk) and makes difficult to prospect for competition between the consumption of cow and camel milk. The Tedjane dairy plan represents an example of successful investment in the agricultural sector in the Saharan region and a model for actors involved in the development of the local milk sector by promoting camel milk as a product of exceptional value. The dairy plan has a promising project to develop its productive potential (collection, production and processing). The scientific and technical support from the scientific and financial communities, public financial support and a structural organization of herders groups could effectively contribute to achieving the stated objectives and go through the Tedjane products internationally.

## ACKOWLEGMENTS

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## BIBLIOGRAFÍA

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Aouachria, A 2020, Qualité hygiénique du lait de Chamelle Arbya D'El Oued, Algérie- : Présentation de sa Fiche technique pour l'obtention du label d'indication géographique. Mémoire de fin d'étude en vue de l'obtention du diplôme de master académique en sciences biologiques. Université Echahid Hamma Lakhdar EL-OUED, Algérie.

Bakheit, SA, Faye, B, & Ibrahim, IE 2015, Effect of improving management system on camel milk production. *Journal of Natural Resources and Environmental Studies*, vol. 2, no. 2, pp.13-22.

Bakheit, B. Faye, A.I., & Ahmed, I.S 2016, Effect of farming system on camels calving interval in western Sudan. *Turkish Journal of Agriculture. Food Science and Technology*, vol. 4, no. 5, pp. 418-423.

DRDPA 2011, Direction of developmental and regulation of agricultural production. (Ministry of Agriculture and Rural Development). Report 2010, Algiers, Algeria, P. 124.

DSA 2019, Direction des Services Agricoles, statistical service, Distribution of camels in the Wilaya of El Oued.

El Hassani Kacimi, S 2013, La Dépendance Alimentaire en Algérie : Importation de Lait en Poudre versus Production Locale, Quelle Evolution ? *Mediterranean Journal of Social Sciences MCSER Publishing, Rome-Italy*. vol. 4, no. pp. 152- 158.

Nagy, P, Thomas, S, Markó, O, & Juhász, J 2013, Milk production, raw milk quality and fertility of dromedary camels (*Camelus dromedarius*) under intensive management. *Acta Veterinaria Hungarica*, vol. 61, pp. 71-84.