



Breeding and Nutrition of Camels in Algeria [†]

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[†] Presented at the 10th International Seminar of Veterinary Medicine: Camelids in Algeria & Maghreb, Constantine, Algeria, 20–21 December 2022.

Abstract: Among the mammals domesticated by humans for their needs, the dromedary, which is a versatile animal, is used for the production of milk, meat, wool and skin, as well as for sports, tourism and transport. However, knowledge about the breeding and feeding of this animal is limited. The objective of this work is to synthesize previous works on the breeding and feeding of camels in Algeria. The results show that the main farming systems are transhumant, sedentary and nomadic. In addition, the diet of the dromedary is based on different types of Saharan routes and constitutes the main element upon which an extensive camel breeding system is based. Thus, for a better valorization of this species, further studies on the diet and breeding methods of camels are recommended.

Keywords: camelids; Algeria; breed; nutrition; Sahara



Citation: Boukhechem, S.; Dib, A.L.; Bougherara, H.; Bouaziz, A.; Kadja, L.; Ghoulal, K.; Oubira, I.; Chari, Z.; Kerrou, N.S.; Lamri, M.; et al. Breeding and Nutrition of Camels in Algeria. *Biol. Life Sci. Forum* **2023**, *22*, 5. <https://doi.org/10.3390/blsf2023022005>

Academic Editor: Boussena Sabrina

Published: 30 March 2023



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1. Introduction

The Camelidae is included in the genera *Camelus* (dromedary and Bactrian species) and includes the Llama (guanaco and llama) and the Vicuna (vicuna and alpaca). However, camel is often used to describe all the aforementioned camel-like animals. Furthermore, the one-humped dromedary (*Camelus dromedarius*) accounts for more than 90% of all camels, while the two-humped Bactrian camel (*Camelus bactrianus*) accounts for only 10% [1]. According to the FAO 2020, the total number of camels recorded in the world was 35,525,270 in 2018 and could reach 60 million in 25 years [2]. Additionally, Alaskar et al. [3] reported the following distribution of camels in the world: 33.02% in East Africa, 20.9% in Central Africa, 15.96% in North Africa, 5.27% in West Asia, 4.05% in Australia, 2.11% in East Asia, 0.94% in Central Asia, and 0.02% in Europe. Five neighboring countries, including Somalia, Ethiopia, Kenya, Sudan and Djibouti, hold 84% of Africa's camel herd and more than half of the world's camel herd. In addition, camel breeding system is different from one country to another, and their feed needs are not determined, with only a few recommendations being available. In addition, compared to other species, the scientific community has given less importance to this animal [4]. Thus, these aspects have raised our interest to synthesize previous works on the breeding and feeding of camels in Algeria.

2. Camel Breeding in Algeria

Although camel breeding remains marginal in Algeria, it represents an invaluable animal resource for the desert regions. Thus, the evolution of camel breeding over the past two decades has fluctuated from 234,220 heads in 2000 to 324,199 heads in 2013 and 416,519 in 2018; when considering these numbers against only 120,000 heads in 1987, it shows the importance given to this animal's breeding and its participation in the national economy through the creation of jobs and the satisfaction of the needs for animal products among local populations [5]. Camel breeding in Algeria is distributed over three agro-ecological territories, including the Sahara, the Saharan Atlas and the Steppe. Thus, it is present in 17 Saharan wilayas (prefectures) and 9 steppes [6]. According to a study by Bedda et al. [7], in the region of Ouargla, three systems are identified, including a transhumant system at 77.07%, a sedentary system at 14.01%, and a nomadic system at 8.91%. These results were confirmed by a study carried out by Harek et al. [8], who determined four systems but with different percentages, including nomads at 41%, transhumant people at 21%, semi-nomads at 18%, and sedentary people at 20%. In addition, the color of the coat that falls within the standards of certain animals, such as cattle, is often a characteristic of the breed of this animal. Among the coat colors of camels, Hamra (red dress), which represents 30% of the herd, is appreciated by breeders and considered an animal that tolerates drought and resists disease; Safra (yellow) is frequent at 27.5% and is an animal with one of the favorite colors of farmers; Chegra (light reddish) is found on all farms and throughout the Southwest (11%), but it remains the least appreciated by breeders; Beydha (very light grey or white) is known for its aggressive behavior and susceptibility to disease; Zarga, which is totally black and is often called Zarga, is the least preferred compared to animals with other colors but is not susceptible to diseases; Hadjla, which has a white color on the head and the limbs and a different light yellowish color on the body, is also very appreciated aesthetically, but its frequency is very low in the farms (9.5%); and finally, Zarwala, which has a mixture of blue, white and black (hybrid), remains the least appreciated by breeders and is characterized by a severe form of deafness [9]. In addition, the different populations of camels encountered in Algeria are also distributed according to the geographical area or the tribe to which the animal belongs, namely "Chaambi", "Ouled Sidi Cheikh", "Ait Khebbach", "Camel of the steppe", "Saharaoui", "Targui or Mehari", "Ajjer", "Reguibi" and "Ftough" [6].

3. Camel Feeding in Algeria

The diet of the dromedary is based on the different types of Saharan routes and is the main element upon which an extensive camel breeding system is based [10]. However, for a better protection against winter attacks, breeders give them a mixture of wheat, barley and hay in November and release them into the wild in February to enjoy the mountain pastures. The first zone traveled by camels, represented by the steppe and the north of the Sahara (Naama, Bayed, Béchar, Tindouf and the north of Adrar), is characterized by halophilic plants. The farther second zone, which is located south of Adrar and in the extreme south, is characterized by non-halophyte plants. According to a study carried out in Algeria by Slimani et al. [11], plants that are browsed by the dromedary consist mainly of perennial spontaneous plants comprising 13 species belonging to 10 families [10]; in the northern Sahara, there is the presence of 12 species from 8 families. In addition, according to Harek et al. [8], plants that are most browsed by camels with a variable degree of palatability in the Hoggar region are *Tamarix aphylla* and *Tamarix gallica*, as well as other vegetative associations, as shown in Table 1.

Table 1. The different Saharian plant species browsed by camels.

Regions	Plant Species	References
Northern Sahara	<i>Bassia muricata</i> (L.) Asch., <i>Spergularia salina</i> (Ser.) Presl., <i>Helianthemum lippii</i> (L.) Pers., <i>Argyrobolium uniflorum</i> Jaub. et Spach., <i>Astragalus cruciatus</i> Link., <i>Astragalus ghyzensis</i> Bunge., <i>Lotus roudairei</i> Bonnet, <i>Erodium glaucophyllum</i> (L.) L'Her., <i>Limoniastrum guyonianum</i> Boiss., <i>Cutandia dichotoma</i> (Forssk.) Trab., and <i>Zygophyllum album</i> L.	[10]
Hoggar region	<i>Panicum turgidum.</i> , <i>Balantite aegyptiaca.</i> , <i>Cornulaca monocantha.</i> , <i>Schowia purpurea.</i> , <i>Aristida pengens.</i> , <i>Astragalus vogelii.</i> , <i>Morettia canescen.</i> , <i>Tribulus alatus.</i> , <i>Panicum turgidum.</i> , <i>Acacia radiana.</i> , <i>Acacia seyal.</i> , <i>Schowia purpurea.</i> , <i>Cornulaca monocantha.</i> , <i>Aristida pungens.</i> , <i>Moricandia arvensis.</i> , <i>Schouwia purpurea.</i> , <i>Tribulus terrester.</i> , <i>Trichodesma calcaratum.</i> , <i>Forsskaolea tenacissima.</i> , <i>Maerua crassifolia.</i> , <i>Salvadora persica.</i> , <i>Atractylis aristata.</i> , <i>Balanites aegyptiaca.</i> , <i>Echinops bovei.</i> , <i>Colocynthis vulgaris.</i> , and <i>Atriplex halimus.</i>	[8]
Sahara	<i>Launea mucronata.</i> , <i>Moltkia ciliata.</i> , <i>Oudneya Africana.</i> , <i>Pteranthus dichotomus.</i> , <i>Helianthemum lipii.</i> , <i>Genista saharae.</i> , <i>Limoniastrum guyonianum.</i> , and <i>Zygophyllum album.</i>	[11]

4. Conclusions

There have been very few studies conducted on the diet and energy needs of camels in the world and in Algeria. Thus, further studies are recommended in order to determine the needs of camelids in a strategic way. In addition, it would be essential to develop a program involving different countries to measure the energy, protein and other nutrient requirements for camel breeding, growth and racing. Additionally, in-depth studies on genetics would make it possible to determine the standards of camel races in Algeria and in the world.

Author Contributions: Conceptualization, A.L.D.; methodology, A.L.D., S.B. and H.B.; software, A.L.D., S.B. and H.B.; validation, A.L.D.; formal analysis, N.L.; investigation, A.L.D., S.B. and H.B.; data curation, A.B., L.K., I.O., N.S.K., M.L., Z.C. and K.G.; writing—original draft preparation, A.L.D.; writing—review and editing, A.L.D. and N.L.; visualization, E.-H.B.; supervision, A.L.D.; project administration, E.-H.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The works consulted are detailed in the bibliography.

Acknowledgments: The authors acknowledge the support and help of Mohammed Gagaoua, a researcher from PEGASE INRAE.

Conflicts of Interest: The authors declare no conflict of interest.

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