


# Place of the Dromedary in the Ecological Balance of Its Saharan Ecosystem <sup>†</sup>

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**Abstract:** The dromedary is the only breeding species capable of adapting to the harshness of its desert environment. It manages to reproduce, making the most of the very meagre floristic resources of the Saharan ecosystem. Moreover, thanks to these adaptive faculties and its particular feeding behaviour, it contributes largely to the preservation and proliferation of the floristic cover of its Saharan rangelands. Indeed, an overview of studies conducted by our research team has shown that this animal lives in perfect harmony with its environment. On the one hand, it adopts a mode of ambulatory grazing that respects the balance of floristic and vegetative diversity: (1) by being very selective with regard to the species and parts of the plant; (2) by moving from one plant to another without exhaustion and without uprooting; (3) by grazing the parts of the plant (stem leaves, seeds) according to availability; (4) by managing to cover its daily needs, whatever the variations in fodder supply (linked to seasonal climatic variations); and (5) by travelling daily distances that can exceed 50 km/day, so as not to exhaust and overload restricted spaces. On the other hand, the camel, by endozoochory, could play an important role in the long-distance seed dispersal of many wild plant species, and contribute to the maintenance of the diversity and propagation of its floristic cover. After gut passage, the germination percentage of seeds with physical dormancy increases and faeces represent a significant source of organic matter that is favorable for germination and seedling growth until favorable conditions (rainfall) for their germination occur.



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## 1. Introduction

The dromedary lives in a very harsh and restrictive desert environment, where climatic conditions are at their most severe, characterized, in particular, by very high temperatures and very low and irregular rainfall [1,2]. This results in a well-adapted, very thin and very poor (very lignified) floristic cover [3]. This vegetation is the most perceptible witness of the climate [4]. The dromedary is the only livestock species capable of exploiting and enhancing these vast Saharan expanses. Several studies have highlighted the animal's anatomical and physiological adaptation to desertification, enabling it to conserve its energy [5], go without drinking for many weeks [6], recycle its nitrogen and make do with a poor diet. Moreover, because of its feeding behaviour, the dromedary grazes in such a way as to preserve its ecological environment [7]. It does not overgraze any type of vegetation and can reach the upper layers of plant formations, it does not strip the soil and the topsoil does not volatilize when trampled [8]. With a prospect of continuing this work, and in order to have data specific to camel farming in Algeria, our research team has set itself the objective of focusing on the relationship between the animal and its environment, by studying the contribution of the camel to the ecological balance of its Saharan ecosystem. This has been

approached in two ways: the first is the daily monitoring of the camel in its pasture, in order to study the impact of its feeding behaviour (species and plants grazed, quantities, parts and organs of plants, grazing duration, distances travelled, etc.) on the preservation of the floristic cover of its Saharan ecosystem, and the second is to study the role of the dromedary in the seed dispersal and germination of wild Saharan plants by endozoochory (diversity of seeds collected from camel faeces, seed germination after passage through the digestive tract, in vitro and in vivo, etc.).

## 2. Materials and Methods

To monitor the feeding behaviour of the dromedary, we directly observed it during grazing, based on video sequences recorded during the day (morning and afternoon). The diet was determined by the bite method, inspired by the work of [9,10].

For seed dispersal by endozoochory, we collected camel faeces from the dromedary's rangeland and analysed their seed contents, which were then subjected to germination tests (in vitro and in vivo) and compared to seeds directly taken from the parent species in the field.

## 3. Results and Discussion

Our study on the feeding behaviour of the dromedary showed that its activities on rangelands were directly affected by the availability of fodder, related to seasonal variation. In general, the dromedary grazed 28 species, amounting to 82% of the species present on the rangeland. However, the diet was more diversified in the autumn and spring (12 and 19 species) than in the winter and summer (five and four species). It devoted 67% of its time to grazing in the cooler seasons, compared to only 34% in the warmer seasons. The most abundant species were generally the most grazed ( $p$ -value = 0.001). It grazed in groups, especially in relation to trees or large plants. It could travel up to 50 km/d and constantly wandered around the foot of plants, taking small bites from each individual one. The duration of grazing, per plant, depended on its architecture and size ( $p$ -value of 0.000), thus favouring the revitalization of its space. In spite of the spatio-temporal variations in the fodder supply of its rangelands, it composed rations that covered its nutritional needs. The daily quantity grazed varied from 0.42 to 3.71 kg of dry matter/100 kg live weight/day, depending on the season and the floristic procession of the rangeland ( $p$ -value 0.00). An analysis of the rations consumed showed that the dromedary, thanks to its selective aptitudes, was capable of self-sustaining its nutritional needs (UFL and PDI) whatever the vegetation present and whatever the season and the rangeland. To that end, seasonal and spatial (rangeland) variations were not significant for the nutrient supply of the rations consumed, recording respective  $p$ -values of 0.684; 0.202 for energy, and 0.623; 0.128 for nitrogen.

Regarding the role of the camel in seed dissemination, we collected 39 species from faeces (in good condition), belonging to 18 botanical families. At the same time, 22 species belonging to nine botanical families retained their germination power after passage through the digestive tract. In addition, faeces offered a favourable microclimate and amounted to a significant source of organic matter favouring the growth of seedlings. Finally, it can be deduced that the dromedary, because of its ambulatory feeding behaviour over very long distances, remains the best animal species for dispersing seeds in the Saharan environment.

## 4. Conclusions

The data from our study showed that the dromedary, because of its particular feeding behaviour, contributes largely to the maintenance and proliferation of its floristic surroundings by a reasoned selection and grazing of species according to their availability and abundance, and the dissemination, lifting of dormancy and dispersion over long distances of the seeds of wild Saharan plants, etc. This led us to conclude that it is an animal that lives in harmony with its natural environment, and that it is the only livestock species capable of exploiting and enhancing vast desert spaces.

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