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The 5th Conference of the International Society of Camelid Research and Development
ISOCARD 2018

“ Recent advances in camelids biology, health and production ”

12 - 15 November 2018
Laâyoune, Morocco



جمعة الميوز الساقية للحمرل
Région de Laâyoune
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المملكة المغربية
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وزارة الفلاحة والصيد البحري
والتنمية القروية والمياه والغابات
Ministère de l'Agriculture, de la Pêche Maritime,
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ولاية جمعة الميوز الساقية للحمرل



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What future for camel pastoralism in the world?

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ABSTRACT

The classical typology of camel farming systems into 3 types namely traditional nomadic, semi-intensive and modern intensive is not sufficient to describe the present changes and the complexity of the systems. With the development of peri-urban systems, the transitory settlement and the different constraints to the mobility, the camel farms are at more complex interactions with other animal species, other owners' activities and other spaces. To give an example of the present complexity in camel farming systems, we could evoke the current situation in Mauritania, Chad and Gulf countries. The development of dairy periurban systems (in more or less intensive way) is linked to the growing demand in camel milk by urban consumers, and the milk is sold directly to the consumers on the main roads leading into town, in employee-managed depots, private shops, or in dairy industries. Moreover, the periurban settlement could be transitory and/or involve only a part of the herd (the lactating camels only, the other part being in pastoral areas). In this case, important camel flow occurs between pastoral and periurban area contributing to the multiplication of different types of flows (men, feeds, animals and diseases). However, dairy camel farms are also more and more developed in rural areas when dairy factories can organize the camel milk collecting far away from the town. The camel herds are staying around the village terroirs in promiscuity with small ruminants and cattle. At reverse, in settled feed-lot systems for providing young male camels for meat production, the interactions with other species are not common. Regarding the pastoral systems, the most important parameter is the camel herd mobility. But, this aspect is also marked by a certain complexity. Globally, four types of mobility can be observed: (i) Residential mobility (true transhumance with permanent attachment points at rainy and dry season); (ii) Adaptive mobility face to more and more erratic rainfall; (iii) Opportunistic commercial mobility to satisfy local demands (for example, the present demand of Senegalese butchers in camel meat from Mauritania); (iv) Contractual commercial mobility based on export agreement of live animals from Sahelian countries to North Africa or Gulf countries. In addition, those mobilities could involve the owner and his herd (all the family is moving with the herd) or only the herd (with some shepherds).

INTRODUCTION

Usually, the camel farming systems are divided in "traditional nomadic", which is more common worldwide, and "modern intensive" which is emerging notably in the Middle-East and Gulf countries, the farm "Camelicious" in Dubai being the most popular prototype of such modern dairy farm. Between these two extremes in term of gradient of intensification (Faye, 2011), wide types of camel farms are confusedly regarded as "semi-intensive" without it is clearly defined. However, this classical typology of camel farming systems into these 3 types is not enough to describe the changes and the complexity of the present systems in the world. The present paper, based on the typological analysis of camel farming systems in different camel countries such as Mauritania, Chad, or Saudi Arabia, aims to point out the important changes nowadays with a special focus on the impact for camel pastoralism.

The driving forces of the current changes in camel pastoralism

The main elements acting on the change in livestock farming systems in Southern countries and consequently on pastoralism are regularly cited in the literature: climatic changes, urbanization, globalization of the economy, pressure on the resources, etc. (Mortimore and Adams, 2001). Regarding camel pastoralism, the same parameters are involved in the current changes. We can summarize the driving forces of those changes in 3 main categories: (i) the global environmental pressures, (ii) the economical necessities, (iii) the growing constraints on the resources

The first category of driving forces is obviously in relation with the climatic changes marked in the camel countries by the persistence of drought, for example in Sahel, pushing the camel herds to move progressively in the south of the African continent (Faye et al., 2012) or in altitude as it is observed in Ethiopia and Kenya (Megersa et al., 2014). The second driving force is linked to the increasing demand in camel products for different reasons (notably the expected health effect on consumers) and the progressive entry of those

products, especially milk, in the market at local or even national market. The last main driving force is partly linked to climatic change, but also to the livestock density pressure on rangelands which leads the camel herders to intensify their system. Indeed, the camel demography is marked by an important growing of the camel population, even higher than for cattle and sheep, only goat and in some part of the world, buffalo showing a higher growth (Faye and Bonnet, 2012). One of the consequences of those trends is the concentration of camel herds in the periurban areas with transitory settlement. The different constraints to the mobility linked to the development of periurban systems leads the camel farms to have more complex interactions with other animal species, other owners' activities and other spaces. Finally, the camel pastoralism which is impacted by all these changes, appears more complex than formerly. To give an example of the present complexity in camel farming systems, we could evoke the current situation in different contexts as Mauritania, Chad or Gulf countries.

The example of Mauritania

In Mauritania, the climatic uncertainty (drought) observable since several decennials adds to the regional political insecurity, especially at Mali border. Such insecurity contributes to disrupt the circuits of transhumances and perhaps some caravan activities. On the other hand, the closing of northern border by the Moroccan authorities (officially for sanitary reasons) has also contributed, in addition to the droughts, to the reduction of accessible routes, and to significant disturbances in the herd mobility, especially for long large transhumances accustomed to cross borders. These constraints on mobility explain the increase of interactions at the Senegalese border. This is in addition to the increase of the number of refugees from Mali in the south-east region, most of them being also camel farmers.

The drought has led pastoralists to adopt various adaptive strategies that we can summarize in four main changes: (i) differentiated mobility of herds (see below), (ii) the extension of the pastoral space on neighboring regions, (iii) the distribution of food substitutes (wheat, mil), and (iv) the diversification of income-generating activities (fishing and management of tourist camps) thus securing their presence in a less and less hospitable environment (Correra et al., 2009).

One of the main facts in the country (and other arid countries as well) is the development of dairy camel periurban systems. However, the entity "periurban system" includes a wide variety of farming systems having specific impact on camel pastoralism. Indeed, if the "peri-urbanization" of the camel-stock implies a settlement, this could be transitory or not. Finally, 3 types of periurban systems could be described:

- I. Periurban dairy camel farms having commercial target with an important turnover of the camel stock. Those farms are characterized by the stability of their periurban implantation. They are part of a long-term commercial logic with the aim of valuing their livestock by selling milk and fattened animals (young camels and culling camels). The aim of the producers being to produce a maximum of milk without being encumbered by the non-productive part of the herd, the females are purchased at the end of their gestation or early lactation, providing milk to the drying and resold as dried females as well as the young in most cases. So, there is a constant renewal of the herd. It is a sort of "Kleenex herd". This allows a great flexibility to adapt to the demand but requires making a good choice of the animals at each cycle. The animals resold at the end of the production period are unfortunately destined for slaughter in 80% of the cases, which represents a damaging genetic counter-selection. If this type of management allows an optimization of the food expenditure, intended for the only productive animals, it does not contribute, on the other hand, to the improvement of the productivity of the herd. The pastoralists, in such system, are only new dairy camels' providers and could become single breeders of camel heifers.
- II. Periurban dairy camel farms having commercial target with spatial differentiation of the camel herd. Unlike the previous farms, the non-productive part of the herd (dry females, males and growing youths) is retained but separated spatially from the productive part. The first part is maintained in the pastoral zone while the second one remains sedentary in the periphery of the city. It provokes a number of flows (of animals, biomass, labor, information, various inputs) between the city and the pastoral zone, sometimes over large distances (several hundred km). The pastoral part of the herd can pass through the borders (Senegal or Mali). It follows a complementarity/competition between pastoral and peri-urban areas. The land constraint, and mainly the food constraint in the areas close to the consumption basin leads the producers to keep around the city only the lactating animals. Such a system, finally quite new in sub-Saharan Africa, is developing around all the major cities of the country (Faye et al., 1998). This induces situations of interdependence between places of life within the same

herd, sometimes at significant distances. This also implies a very innovative breeding rules of conduct, the mechanisms of which should be clarified

- III. Transitory periurban farms.** These are pastoralists coming from the pastoral areas in very favorable years, resulting in a large extra milk. Anxious to seize the opportunity of a relatively lucrative sale, they settle transiently on the periphery of the city and sell their milk directly to consumers. These facilities (which may concern only the productive part of the herd) are seldom perennial and the return to pastoral life is cyclical. It is difficult to know what this type of breeding system represents in proportion to the number of periurban farms because the duration of the stay close to the town is highly variable.

In addition of those camel farms more or less concentrated around the city of Nouakchott, there are also rural camel farms that could be defined as farms settled at least partially in villages located at more or less large distances from a medium city. These generally specialized farming systems are characteristic of southern Mauritania where the environment is more favorable to access to supplementary feed resources and where access to inputs and infrastructures (e.g. collection centers for milk) facilitates sedentary activity. There are two types according to their main speculation:

- IV. Settled rural dairy camel farms.** These breeders have settled in rural areas, especially in the southern part of the country, in permanent villages. Benefiting from a more abundant biomass in this area, near the Senegal River, the animals graze in a relatively small radius around the village, but receive food supplements (peanut cakes from Senegal, wheat or corn-based supplements, wheat bran...). The milk is sold in the collection centers complemented by the dairies of Nouakchott (Tiviski, Toplait, Watania...). In case of abundant milk at the rainy season, a part of milk can be sold along the roads, at a more profitable price. In general, the whole herd is kept around the village.
- V. Settled rural fattening camel farms.** The main speculation of these camel farms is the sale of young fattened camels, sometimes milk-fed young ones, and culled females, sold after intensive fattening of 3 months. A colt can be sold 150 to 180.000 UM (405 to €486) depending on its fattening state, and a culled female can reach 300.000 UM (€810). These animals are destined in priority to the national market and formerly to the Moroccan market, but with the closure of the northern border, exports have rebounded to Senegal which becomes a very promising market. Indeed, a recent enthusiasm of Senegalese consumers for camel meat occurs, because they believe, rightly or not, to dietary and even therapeutic virtues of camel meat justifying a very profitable price for Mauritanian producers.

The observed complexity in all settled system is also available in pastoral systems. Indeed, the most important parameter in pastoral camel farms, which represents probably the most common camel farming system, is the mobility, and three types can be observed leading to various types of pastoral camel farms: (1) **residential mobility**: the transhumant breeders have attachment points, usually one in the dry season (main residential area) and the other at rainy season (now increasingly problematic due to erratic rains and repetitive droughts). The whole or a part of the family are moving with the herd; (2) **adaptive mobility**: faced, precisely, to the increasing hazards of rainfall, the camel breeders practice rather a semi-nomadism, which means that the pastoral areas in which the camels graze vary according to the rains and therefore the available resources, but they maintain a home territory; **commercial mobility** which concerns camels subject to commercial transaction, for export and to a lesser extent, for caravan trade (Lluch, 2007). This mobility can take two main forms, (a) opportunistic mobility: this is typically the Senegalese demand for religious events, or (ii) contractual mobility, on the basis of export agreements to North Africa where the demand for camel meat is growing (Algeria, Tunisia, Egypt especially since the closure of the Moroccan border). In addition, those 3 types of mobilities could involve the owner and his herd (all the family is moving with the herd) or only the herd (with some shepherds) while the family unit remains either in town, in periurban area, or in villages in rural areas, or even in camps in pastoral zones corresponding to a more or less permanent home territory.

Such variability in the mobility of the camel herds results in different categories of pastoral camel systems according to their integration into the market. We can distinguish at least 4 types of camel production systems.

- VI. Semi-nomadic extensive system** It is probably the most common system. With the growing urbanization of the country, many camelers remain in towns and villages, or in camps located in relatively favorable places with which some dairy camels are maintained for the needs of the smallholder and visiting guests, the "large camel breeders' families" being reluctant to sell camel milk. The rest of the herd

is nomadizing, depending on the resources available sometimes far away from the owner's place of attachment (several hundred km). Mobility may be transboundary (Mali mainly, or even to Senegal in case of drought). The relatively good mobile phone coverage has greatly improved the ability of breeders to identify favorable areas, and owners, now motorized, to stay in touch with their shepherds.

- VII. Extensive system without seasonal herd keeping.** During cold dry season, camels are left in the Saharan zone, deliberately wandering for several weeks or even months, according to a system defined as *H'mil*, widely described notably in Algeria (Bedda et al., 2015): "as soon as the rangelands are impoverished, the cameleers release their camels to graze without shepherds and without known destination. Breeders during this period can no longer follow the grazing route of their camel herds. They let the herd to have whole freedom to isolate themselves in the vastness of the Sahara, guided by the herd's progenitor, to travel immense distances in search of water and fodder". In such system, the owner occasionally collects animals for sale to domestic or foreign markets in order to satisfy the needs of the family. Within this system as a "picking" subsystem could be identified, where the urbanized owners maintain their herd often obtained by inheritance, without serious concern about its economic valuation, but which gives it a social status and an occasional source of protein.
- VIII. Extensive system integrated into the meat market.** The "good years" in terms of rainfall encourage some owners to buy young animals to fatten them up in pastoral area (pastoral fattening) and sell them at better prices in market. Some businessmen, traders or public servants can invest in this kind of farming. The practice of *H'mil* allows to limit the costs of herd keeping. However, the breeders frequently complain with the increasing pressure of insecurity, including camel theft, growing since the increasing demand in Senegal.
- IX. Purely nomadic system.** The true nomadism is less and less frequent, but it remains in Mauritania, as in the Sahara, some nomads having no home territory and entirely moving according to the available resources. Formerly more common, it decreases gradually in the north and east of the country under the double effect of regional political insecurity and climate change (repetitive droughts) which oblige them to find "refuge" areas during unfavorable years (for example in the National Park of Banc d'Arguin along the Atlantic coast). Then, they turn to a semi-nomadic system that secures their production system (Correra et al., 2009).

These different breeding systems can be schematically represented in a two-dimensional space according to the breeding areas (periurban, rural and pastoral areas) and the degree of mobility, knowing that this mobility itself fits in a multi-dimensional space depending on whether it concerns the whole family unit or not, the whole herd or not (Figure 1). In any case, herd mobility cannot be restricted to the traditional axes of transhumance. Climate change as well as market integration (notably the gradual transition from a milk production based on gift and self-consumption to a market production) have forced spatial and organizational flexibility. Camel breeders are no longer necessarily sedentary or nomadic, but they can be all at once in a context where multi-activity grows.

This summary typology reveals three important things:

- I. the great flexibility of breeders who adapt themselves to the changes in the environment (drought, insecurity, market) and develop strategies for securing and mobility accordingly. The example of growing interactions with the Senegalese market is a good example. Such a statement throws down speeches on the necessary change of the mindsets of pastoralists who in fact have a keen sense of their long-term interests;
- II. the non-operationality of traditional patterns based on the categorization of pastoralists into sedentary, nomadic and transhumant, because due to the flexibility mentioned above, there are frequent bridges between systems and in the end a certain instability of the types of livestock, themselves linked to environmental instability; (iii) the significant margin of progress if development actions contribute in priority to securing the mobility, the processes of intensification of production, and the access ways to the market.

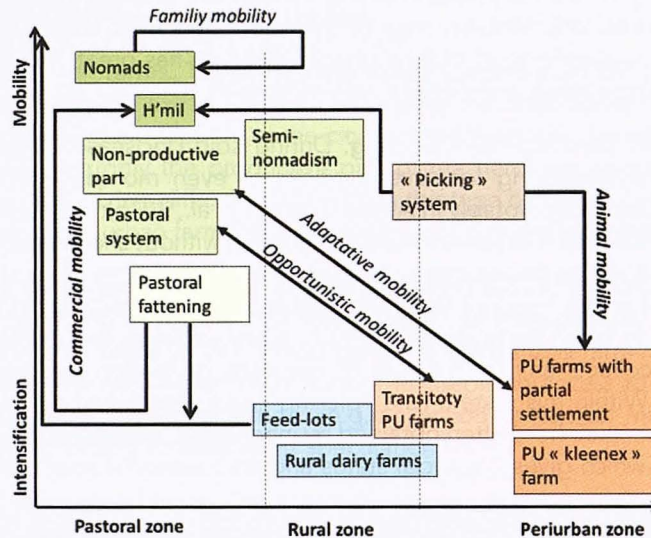


Figure 1. Schematic representation of the distribution of camel breeding systems according to spatial dimensions and mobility.

The example in Chad

Recently, a census of the livestock achieved in Chad has concluded that the country had more than 6 million camel heads. This number is quite higher than the 1.5 million reported in the website FAOstat. This number attests of the high economical importance of camel in the livestock industry of the country. Traditionally, camel farming in Chad is characterized by a very ample moving with transhumance overpassing 1000 km going from the north of the country up to RCA border and even beyond (Aubague et al., 2011).

However, here also, the climatic disorders (recurrent droughts), the insecurity around Chad lake (a traditional refuge area during dry season) due to the conflict with Boko Haram, the increasing demand of the urban areas in camel milk and meat have boosted important changes in the camel farming systems. The capital N'Djamena is grown strongly, and its population is quite diversified with an important part of people coming from the traditional pastoral areas. Consequently, the demand in camel products is explosive. Two characteristic phenomena occur: the multiplication of "camel grill restaurant" where the customers can eat grilled camel meat (Koussou et al., 2012a), and of "milk bar" where camel milk could represent a significant part of the sold products (Koussou and Grimaud, 2013). A recent survey has estimated this part to more than 14% (Koussou et al., 2012b). To satisfy such growing demand, more than 100.000 camel heads are transitory settled around N'Djamena. A milk flow overpassing 22000 liters/day is estimated, and 3200 tons of camel meat is available each year on the local market, essentially provided by peri-urban camel pastoralists. The smallholders try to maintain their nomadic way of life close to the town, living in the traditional tents and continuing their farming practices. During the rainy season, they return to Sahara, then come back around the big cities for selling camel milk along the main roads or directly to urban consumers through a network of collectors and carriers.

The sustainability of such system is questionable. Indeed, the camel farmers complain about the land pressure by agricultural activities around the towns, the degradation of rangelands and the access to veterinary medicine. The modernization of their practices (use of supplementary feeding, improvement of hygienic measures, sanitary prevention), and development of contractual relationships with milk and meat processors are the ways for long term security of this emerging farming system.

The example in Saudi Arabia

In the complete different economical context of Gulf countries, the camel pastoralism knows also deep changes. In a recent study achieved in Saudi Arabia (Abdallah and Faye, 2013), a typology of camel farms in Northern part of the country has concluded that camel farmers were roughly divided in 3 groups approximately in same proportion, i.e. one third of pure Bedouins, one third periurban multi-active camel farmers and one third retired people having camels for fun.

In a more detailed description, excluding big industrial farms for dairy production (with thousand heads), 8 types of camel farming systems were identified:

- I. pure Bedouins having big herd, with traditional way of life, living in desert and regularly moving, using green fodder sometimes added with mineral and vitamin, with sometimes fattening practice, and more or less integrated to market, with low health management. They represented 16.1% only of the studied farmer sample;
- II. pure camel farmers with higher integration to market and modernized management(17.4% of the sample), still moving in desert, having homogeneous herd (only one breed), high turn-over to camel market, practicing early fattening for camel market;
- III. retired people keeping camel mainly for hobby(8.3% of the sample) having low reproductive performances, variable health management, practicing feed supplementation with barley, but having a weak integration to market;
- IV. retired people having camel for market activity(23.9% of the sample) practicing traditional health management but with very high market integration, adding mineral and vitamin in the diet;
- V. small pure camel farmers well integrated to market(12.8%)who are living in desert, but despite a poor management, their activity is targeting clearly commercial objective;
- VI. multi-active farmers with small herd using camel for market(4.1%)but with traditional management(moving in desert, no feed supplementation) except for health prevention;
- VII. Multi-active farmers using camel for hobby with low commercial objective (8.7%) who are living in city, multi-active, herd having one breed only with good reproductive performance, and good calf mortality control;
- VIII. multi-active owner looking for proper commercial management(8.7%)but with moving herds under the responsibility of a shepherd.

Such description shows that the frontier between pastoral, nomadic or settled systems is not so distinct and the status of the owners could move easily.

CONCLUSION

Globally, camel pastoralism is turning under the influence of six trends:

- (i) a tendency towards the partial or total settlement of camels' herds, at least in the most favorable areas and around the largest cities,
- (ii) a tendency towards feeding intensification linked to the reduction of pastoral resources in relation to the growing camel demography and climate change,
- (iii) a tendency towards national market integration for milk (facilitated by the emergence of industrial dairies), and at the regional level for meat, faced with the growing demand even in "non-camel countries" as shown the example of Senegal,
- (iv) a tendency to diversify the activities of cameleers which are less and less exclusively breeders and expect different sources of income (trade in particular),
- (v) a tendency to "speculate" with the idea of using only productive animals then leaving them as soon as production is finished, dissociating the activity of production from the breeding activity. This encourages business people to invest in livestock without being in true farmers. The prototypes are the so-called "Kleenex farms" already mentioned,
- (vi) tendency towards the territorial expansion of the camel even in areas or countries where their presence was formerly anecdotic.

The camel pastoralism is not unchangeable and the current trends testify of the ability of camel farmers all over the world to adapt their strategies to the current world changes.

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