
Camel production systems in Africa

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Camel breeding had and continues to be of major social and cultural importance in Africa which holds more than 80% of the world camel population. The largest flocks are found in Somalia, Sudan, and Ethiopia. According to FAO statistics, an average of one camel for 20 persons is found in Africa.

Nowadays, camel products are increasingly having advantages compared to other traditional animal products.

In fact, camel products markets (meat, milk, hair, and leather) are expanding because of health problems of the other products of cattle, sheep and poultry.

The meat and milk produced biologically and naturally are becoming substitutes of the traditional products.

This paper analyses the camel production systems in Africa and especially the production machine (number, species, etc), practices and production, profitability (financial and economic aspects), marketing and commercialization.

Finally, the main socioeconomic advantages and constraints will be analyzed.

Key words: camel production, camel breeding, production systems, main constraints.

It is difficult to give exact estimates of the camel production potential because of the nature of its non controlled breeding system. Table 1 show that the total number of cattle, camels, goats and sheep in the world reached 1 265 540 animal units in 1997 out of which only 1.2% are camels compared to 82% cattle. For Tunisia, camels represent about 11.4% out of the total number of livestock while cattle represent 37.1% which indicates the importance of camels.

According to estimates of FAO, world camel flock is approximately 20 million. It had increased from 18 million heads during the period 1981-1985 to 20 millions by the end of the twentieth century (Alaya, 1999). In Africa, Somalia is ranked first with approximately 6.1 million

Summary

Camel production potential

Table 1. Cattle, sheep, goats and camel average population in the period 1991-1995 in the world and in 1997 (in thousand heads).

	Cattle		Sheep		Goats		Camels	
	1991-1995	1997	1991-1995	1997	1991-1995	1997	1991-1995	1997
The world	905 219	923 727	22 3908	2102 942	96 586	112 146	18 925	19 373

Source: Alaya, 1990.

heads that is 42.3% of the camel African flock. Sudan occupies the second position with 2 950 million heads (20.5% of the total camel flock in Africa). Mauritania and Ethiopia come in the 3rd and 4th position with 1.1 million heads and 1 million heads, respectively (Table 2).

The North African countries have approximately 900 000 heads including 231 000 heads in Tunisia.

Table 2. The camel African flock (in thousand heads).

Country	Heads
Somalia	6 100
Sudan	2 950
Ethiopia	1 000
Burkina Faso	18
Djibouti	69
Kenya	810
Chad	600
Niger	380
Mali	260
Nigeria	6
Senegal	12
Mauritania	1 100
Tanzania	200
Egypt	135
Libya	129
Tunisia	231
Algeria	125
Morocco	290
Total	14 415

Sources: Alaya, 1999; Faye, 1997; Cheriha, 2000.

Faye *et al.* (1997) classified the importance of the camel breeding in the economies of the countries in Africa based on the proportion of the camel production in the Herbivorous Domestic Biomass (HDB). The HDB corresponds to the total weight of the domestic herbivores. Somalia comes at the head with 55% whereas for other countries, like Nigeria, it reaches only 0.15%. Then, the countries are classified into four categories:

- The countries where camel breeding represents only a marginal activity (HDB < 1%): Nigeria, Senegal and Burkina-Faso.
- The countries where the camel breeding represents an average activity (1 < HDB < 8%): Morocco, Algeria, Egypt and Libya.
- The countries where the camel breeding constitutes a significant part of the agricultural economics (8 < HDB < 20%): Tunisia, Niger, Chad and Sudan.
- The countries where the camel breeding is of primary importance in the economy of the country (HDB > 20%): Somalia, Mauritania, Djibouti. Indeed in a country like Somalia, the export of the dromedary constitutes the main source of foreign currency for the country, 60% of dairy consumption is ensured by the camel breeding.

The four countries Somalia, Sudan, Mauritania and Ethiopia total up to 11.5 million heads, that is approximately 77.4% of the African camel flock.

Importance of the camel breeding in the agricultural economics in Africa

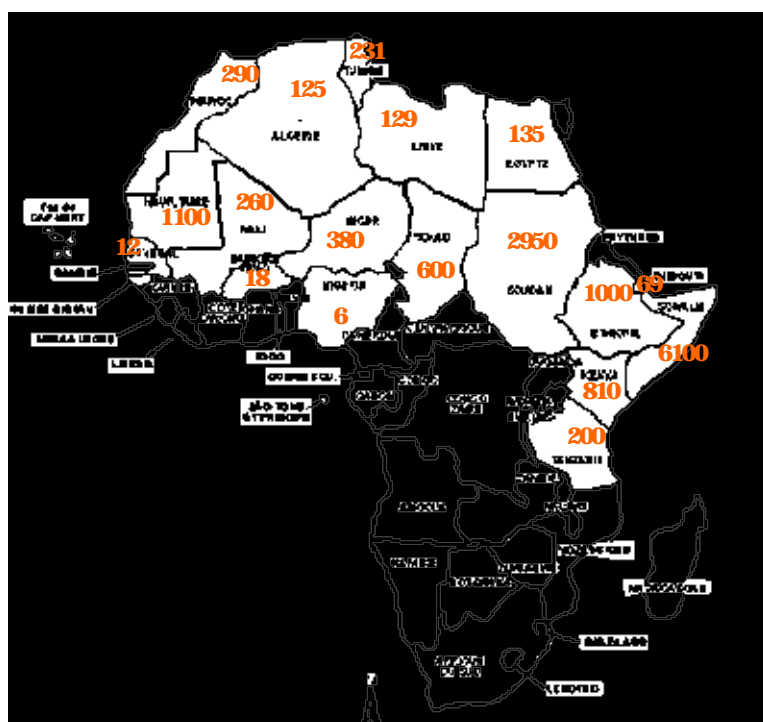


Figure 1. Camel population in Africa (in thousand heads).

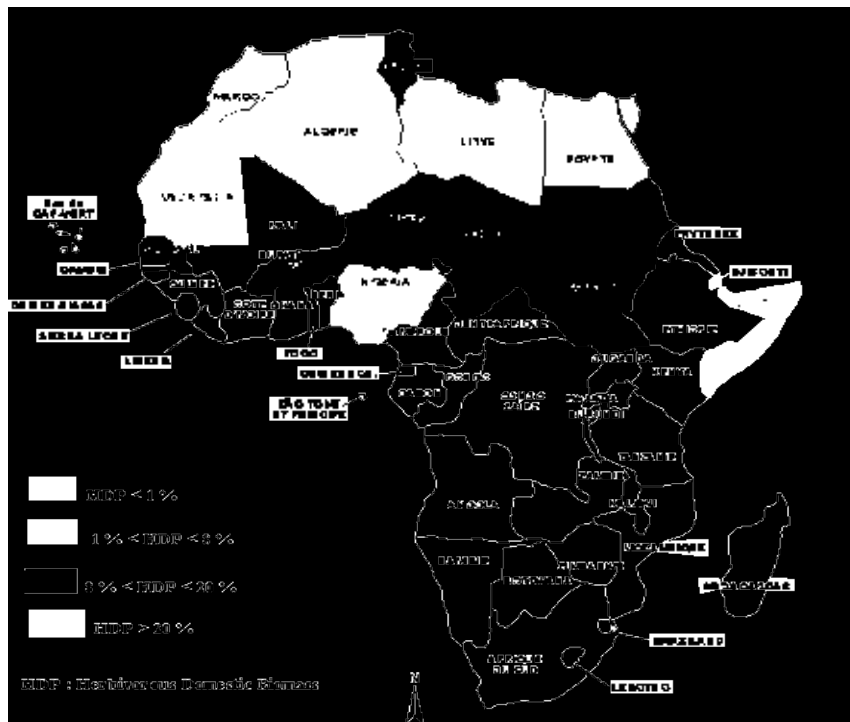


Figure 2. Importance of camels in the agricultural economics in Africa. The HDB corresponds to the total weight of the domestic herbivores.

Camel breeding systems in Africa

Dromedary is known by its preference of open large rangelands since it is able to travel tens of kilometers per day.

In the African countries, two types of camel breeding systems are prevailing:

- The free breeding system.
- The breeding system of accompanied by a shepherd (Controlled breeding system).

The system of breeding in stalling, although it is possible, but almost non practiced.

Free breeding system

It is a traditional breeding system where the herd is left free without guarding.

In general, the stockbreeders attend their herds at long periods (a few months) around the water points. These fixed 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.

It is most widespread in Africa and mainly in the countries of Central Africa and the East Africa. It occupies an important place in North Africa.

For example: the case of “*reguebat*” of the Saharan provinces in Morocco, the case of “*Kel Ewey*” of Niger in the area of Timia which moves up to Nigeria (Faye *et al.*, 1997), the case of the “*Mérazzigues*” in the Tunisian Sahara where the camel herds can move hundreds of kilometres in the large Saharan rangelands in Libya and Algeria.

The advantages of this breeding system are :

- The freedom of movement of the animals on large areas and good rangelands.
- More economic efficiency (low costs of breeding).

The most important disadvantages are:

- High risk of animals loss (attacks of predatory, etc.).
- Low productivity.
- can cause damages to thers (cultivated fields, etc.).

In this case, the herd is kept by a shepherd who is in general accompanied by shepherd assistance. The movements and the choice of the grazing lands are controlled by the shepherd. The operations births, health treatments and watering are assisted. The average size of a herd varies from one country to another in Africa (20 to 100 heads per herd). In general, a shepherd controls an average herd of 50 to 80 heads.

This breeding system is practiced in the countries where the grazing areas are limited and the camel breeding is regaining economic interest. It is found more in the countries of North Africa (Tunisia, Libya, and Morocco).

Advantages of this system are:

- Controlled breeding system
- Better range management.
- Reduction of the losses.
- Better productivity.

The disadvantages are:

- High production costs.
- Scarcity of qualified shepherds.
- Needs for means of transport.

The camel production systems in Africa are diverse enough. The main characteristics of the major geographical areas will be analyzed in the following section (Table 3)

Three main areas are distinguished:

- East Africa: Somalia, Sudan, Ethiopia;
- North Africa: Egypt, Libya, Tunisia, Algeria and Morocco;
- Central Africa: Kenya, Chad, Mali, Mauritania and Nigeria.

Concerning the case of Somalia, Sudan and Ethiopia, the camel production system is marked by the existence of large herds (100-5 000 heads/flock) and of an important diversity of races. The average weight of an animal varies between 400-750 kg and it is around of 650 kg. The big animals size is dominant (Cheriha, 2000; Idriss, 2003).

Controlled breeding system

Main characteristics of the of camel production systems in Africa

Table 3. Synoptic table of the main characteristics of the camel production in Africa.

	Average herd (units)	Average weight of adult (kg)	Principal production	Dairy production l/day	Milk Marketing	Other uses	Sector	System	Export/import
North Africa (Egypt, Libya, Tunisia, Morocco)	20-80 heads	400 (250-800)	Meat milk	1.5-6	Not	Transport racing ploughing tourism	Private sector	Extensive semi-extensive	Import from Sudan, Chad, Mauritania
Central Africa (Kenya, Chad, Mali, Mauritania, Nigeria)	-	250-300	Meat milk	1.5-8	Yes	Transport race ploughing	Private sector	Extensive	Export to Gulf countries, Libya, Morocco
East Africa (Somalia, Sudan, Ethiopia)	100-5 000	650 (400-750)	Meat milk (according to the breeds)	5-10	Yes	Transport racing ploughing	Private sector	Extensive	Export to Gulf countries, Egypt, Libya

The objective of the breeding depends on the races. The dairy races exist and produce on average 5 to 10 litres per day. The milk marketing is practiced in Somalia and Ethiopia (Cherih, 2000; Idriss, 2003).

Animal herders in Sudan lead a nomadic life combined with minor crop production activities for about four months of the year i.e they are agro-pastoralists. The average herd size is around 193 heads, about two thirds of which are females and one third males. Animals depend completely on natural grazing in Darfur province, and mostly on natural grazing with some supplementary feed in Kordofan and the Eastern provinces. Supplementary feeding is composed of sorghum grain, oilseed cakes, sorghum straw and concentrates. It is mainly for weak animals. Animals and their products form the main source of income for these pastoralists. Income from camels is in the form of animals and milk sales and the other sources of income come from crop sales and transfers from relatives working in Saudi Arabia and the Gulf States. Milk sales are limited in Western Sudan but in Eastern Sudan about 25% of milk production is sold either fresh, in form of yoghurt or liquid butter (Sakr and Abdel Majid, op. cit.). The main problems indicated by the herders include shortage of drinking water, spread of camel diseases, and lack of veterinary services and encroachment of agricultural activities on grazing land. (Idriss, 2003).

The camel breeding is dominated by the private sector. It was reported that stakeholder can own up to 2 million camels in Ethiopia (Faye, 1997). The breeding system is in general extensive. The three countries are among the main exporting countries of camels to Egypt, Libya and the Gulf countries of the Gulf. For example, Sudan exports approximately 200 000 heads to Egypt (Idriss, 2003).

In the countries of Central Africa (Kenya, Chad, Mali, Mauritania and Nigeria), the camel production system is characterized by herds of less important size, except some cases in particular Mauritania.

The average weight of the main races is 250-300 kg per animal. The principal objective depends also on races but it is mixed production of meat and milk. The dairy production lies between 1.5 and 8 litres per day (Cherih, 2000). Milk marketing is practiced but it is not very widespread. Other uses of camels are transport, racing and the agricultural use. The system of breeding is extensive. Exports of camels are practiced to other countries such as Algeria and Libya.

Concerning North Africa (Egypt, Libya, Tunisia, Algeria and Morocco), the camels production systems are marked by very diverse sizes ranging from few heads in the case of agro-pastoral systems to thousands as in the case of Morocco (Faye, 1997; Sghaier, 2003). In general the average size is 50 to 100 heads per herd. The average weight by animal varies according to the races. It is located between 250 and 700 kg/head (Cherih, 2000).

The main objective of the breeding is the production of meat. The dairy production is secondary and varies from 1.5 to 6 litres/day. The milk marketing is not practiced and the markets are almost missing.

Dromedary is used as means of transport, racing (Mehary race), and draught animal in agriculture. Recently the dromedary starts to be exploited in the tourism sector as it is the case of Kébili and Douz in the south of Tunisia. In this case, the dromedary is used as means of transport in the tourist tours. The average annual income by animal is estimated at 1 160 TND/year (1000 \$/year) which represent 400% of the annual income earned from a she camel destined for livestock production (Sghaier, 2003).

Productions

The statistics related to the estimation of camel production in Africa are not precise and are fragmented. The production of camel meat was estimated in 1994 at 248 000 tons that is 82.6% of the world production (approximately 300 000 tons).

The studies carried out by the ACSAD give more precise estimates for the studied countries. According to Idris (2003), the production of camel red meat in Sudan increased from 1 275 000 tons in 1996 to 1 624 000 in 2002. For the case of Tunisia, Sghaier (2003) reported that the camel red meat production evolved from 2 150 tons in 1997 to 3 500 tons in 2003. Meat is the main product of camels and represents about 2.5% of the total red meat production in the country. The average annual camel meat production has increased during the Ninth Economic Development Plan (EDP) from 2 150 ton to nearly 3 000 ton in 2001.

Estimates of the tenth EDP are expected to increase the contribution of camel meat to about 10% of the total red meat production. Planners responsible for the sub sector hope that camel meat production increases from the 3 300 ton per year level at the beginning of the Tenth EDP (2002-2006) to reach 4 050 ton per year by the year 2006. The planned annual increases are shown in table 4.

The evolution of other products in a country like Tunisia is described in table 5. Milk production from the Tunisian camel breeds is rather limited. Quantities produced are therefore intended mainly for consumption by camel herders and shepherds. Beside the fact that quantities produced are limited, whatever is produced is difficult to assemble, store and transport. Having said that, these limitations should not obscure the social and economic value of this promising product because of its nutritive and medicinal value (Some people take it as medicine for diabetes).

The total milk production, as shown in table 5, is expected to increase from 13 750 tons in 1997 to 19 875 tons in 2006.

Table 4. The development of camel production during the Ninth EDP and estimates for the tenth EDP.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Production (ton pure meat)	2 150	2 280	2 400	2 400	3 000	3 300	3 500	3 650	3 850	4 050

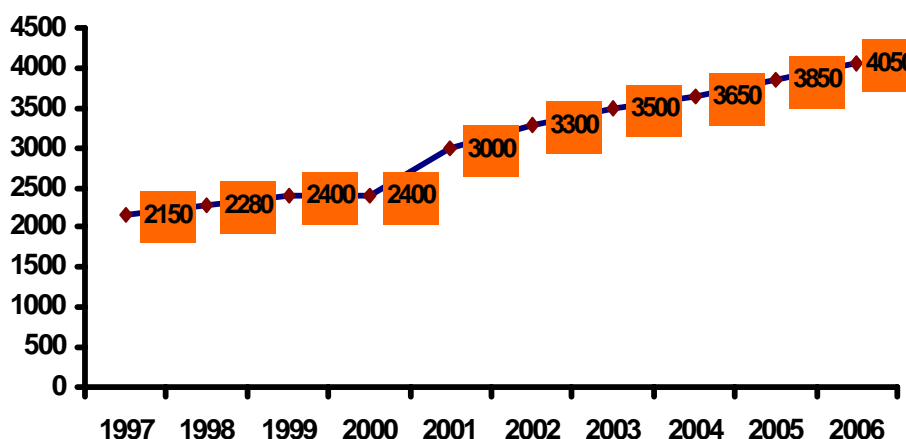


Figure 3. Meat camel production during the Ninth EDP and estimates for the tenth EDP in Tunisia (tons/year)

The products of hair hides, on the other hand, represent the raw materials for the cottage industries in the Southern part of the country. The average hair production per head is estimated at 3 kilograms per year. Table 4 shows the current and estimated future projections:

The figures in table 5 indicate that the average annual production of camel hair is about 220 tons and the average annual production of hides is about 698 tons.

The distribution of these products does not follow a certain established marketing channel but rather a simple rudimentary distribution system that is confined to family members and those involved in cottage industries.

Table 6 shows the estimates of other camel products in the majority of the African countries are given per capita and per race, especially dairy production.

It is noticed that the best performances of dairy production are recorded in Egypt (1 600-4 000 litres/year/lactation) and Libya (1 200-3 500 litres per year/lactation). Countries like Somalia, Ethiopia and Sudan keep high performances but far below the potentialities because of the dominant extensive breeding systems.

Table 5. Estimates of camel milk, hair and hides production

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Hair	181	184	205	205	213	220	231	243	251	262
Hides	577	585	651	651	677	701	734	773	800	835
Milk	13 750	13 925	15 500	15 500	161 125	16 00	17 475	18 400	19 050	19 875

Source: Officer of camel and small animals, 2001.

Table 6. Average production of camel milk in some African countries.

Country	Dairy production	
	Litres/day/head	Litres/year/head
Somalia	9	1 800
Sudan	5-10	1 500-2 500
Tunisia	1.5-5	300-1 200
Egypt	4-15	1 600-4 000
Algeria	4-8	-
Chad	3-5	-
Kenya	4-6	-
Ethiopia	7	2 450
Eritrea	5-6	-
Libya	3-6	1 200-3 500

Source: Cheriha, 2000.

Constraints and advantages

It is not easy to draw up a common and complete diagram of the main constraints and advantages of the camel production systems in Africa because of the specificities of each country and the lack of adequate data. Nevertheless, in a general synthesis will be presented here.

Main constraints

The camel production systems in Africa face several constraints of various importances and in particular:

- Low economic interest of the camel breeding in the economies of the countries with rare exceptions like Somalia.
- The breeding systems and the of control modes of the camel breeding remain traditional.
- The socio-economic and technical difficulties facing the modernization of the camel production systems.
- The absence of well organized markets for camel products in spite of the renewed interest in these products for their biological quality.
- The insufficiency of programs and strategies for the development of the camel sector at various scales: national, regional and international;
- The lack of organization of the camel breeders (associations, co-operatives, etc.) to face the dominating role of the speculators and intermediaries who have major control of the sector.
- In spite of the scientific achievements, the knowledge on camels remains insufficient and do not allow to encourage the sector.
- The insufficiency of the scientific research programs at the various scales (national, regional and international). One can quote here, the example of the regional program implemented by ACSAD, "The Camel Applied Research and Development Network (CARDN)".
- Low productivity compared to the available potentialities.
- Absence of channel for the main camel products marketing.

The main advantages could be as follow:

- Social importance of the camel breeding which represents the main income activity of most of the pastoral populations in the arid, semi-arid and desert zones of Africa.
- High level of knowledge of the camel breeding production system and the existence of a rich local know-how of this type of breeding,
- Low production costs.
- The natural and biological production conditions would allow the camel products of being substitutes of other livestock products (cattle, etc.).
- The availability of an important productive potential (approximately 80% of the world camel population).
- Existence of a high comparative advantage of the camel products in Africa.
- Beginning of a serious renewed interest in camel breeding in the development strategies of the African countries.

Main advantages

The camel production systems in Africa are very diversified and play an increasingly dominating role in the economies of many countries. Because of its socio-economic and cultural role within a large portion of the pastoral and nomad communities in the African arid and desert regions, this economic activity represents a high local potential solution for poverty alleviation in Africa.

The milk and especially camel meat, which are produced naturally and biologically, would occupy important place on the global market. However, this remains obviously dependent on the implementation of serious national, regional and international strategies for the development of the camel production sector in Africa.

The expansion of the camel use by other sectors, such as tourism and racing, offers new socio-economic opportunities to increase the profitability of the camel production system.

Though the scientific research achievements are modest, they open new horizons for the modernization of the sector in order to improve the productive performances of camels in Africa.

Conclusions

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