

## Review Article

### Production potential of camel and its prospects in Pakistan

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#### Abstract

Camel is the best useful addition to the food chain, as it provides milk, meat and byproducts. Recently twenty breeds of camel are documented in Pakistan. The two main types are riverine and mountain camels that are found in sandy deserts, coastal mangroves, mountainous tracts and irrigated plains. Socio-economically camel is very important as it is used in drawing water from wells, ploughing, leveling, grinding grains, crushing sugarcane, pulling carts, oil extraction and transportation. A well fed camel can yield 15-20 liter milk daily while growth rate is up to 1 kg per day. Camel milk is used for making yogurt, kurth, butter, ghee, khoa and rabri. Hides, hairs and some fine wool are byproducts of camel. Collaborative research, registration of camel herds, organized marketing, establishment of camel health centers, selection and application of modern breeding techniques, fattening of males, special incentives or hardship allowances and camel ranching schemes are the measures by which we can utilize this indigenous genetic resource to cope with increasing demands of food.

**Keywords:** Production potential, camel, prospects

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## INTRODUCTION

Camel is a potential animal which is serving millions of people especially in arid, semi arid, mountainous and desert areas of the world. It provides milk, meat, hides, hairs, wool and transportation. Camel is also considered as status symbol in many of the areas in the country. Some research work has been done in nutrition, physiology, reproduction and health of camel. But the production potential of camel has scanty work. Camel milk is never appreciated properly as it values (Younas and Iqbal, 2001). Need of the day is to recognize the significance of camel in the changing global scenario and to develop the niche properly that can harbor this vital species.

Camel is an even-toed ungulate having unique physiological characteristics. It has distinctive fatty deposits known as "humps" on its back. There are two species of camels: 1- Dromedary or Arabian camel which has single hump 2- Bactrian which has two humps. Dromedaries are native to the dry desert areas of West Asia while Bactrian camels are native to Gobi Desert, central and East Asia. The animal has spreading toes on feet that help to keep it on top of sand. Fatty hump stores energy for the

camel during times of water scarcity. It can close its nostrils during sand storms. This animal has certain special defences also as it is a fast runner, bites when threatened, spits on others when they approach it or get too close and spit foul-smelling liquid.

Camel has special attributes but its hump does not contain water, as some people think. In fact, it is a store of fat which the animal can live off when food is scarce. An Arabian camel's hump shrinks as the fat inside is used up in hard times.

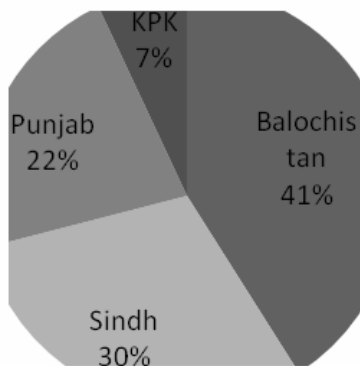
Camel is a versatile animal it sustains its life in hot and harsh environments and performs very well. Camel is called as "Ship of the Desert". It can perform very well in those areas where other animals merely sustain their life. It has no comparison regarding feed and performance with any other animal.

#### Population and Distribution

Worldwide camel population is 24 million. Pakistan ranks 8<sup>th</sup> among major camel raising countries in the world (FAO, 2010). Pakistan's camel population is about 1 million (Economic Survey, 2011-12). Population distribution of the animal within the country is shown as Fig. 1. Baluchistan has the highest

population (41%) of one-humped camels (dromedaries), followed by Sindh (30%), Punjab (22%) and KPK (7%) (Census, 2006).

Pakistan has maximum population of dromedary camels (single humped) along with that a few herds of Bactrian camels (double humped) found in northern areas. According to Qureshi *et al.* (1993) there are four ecological zones of camel production in Pakistan: 1- Sandy deserts (Thal and Cholistan in the Punjab and Thar in Sindh), 2- Coastal mangroves (Thatta, Badin and Karachi districts of Sindh), 3- Mountainous tracts (all of Balochistan, and the D.G. Khan and D.I. Khan districts of Punjab and KPK, respectively) and 4- Irrigated plains (all irrigated districts of Punjab and Sindh) (Fig. 1).



**Figure1:** Graphical representation of population distribution of camels in four provinces of Pakistan (Census, 2006).

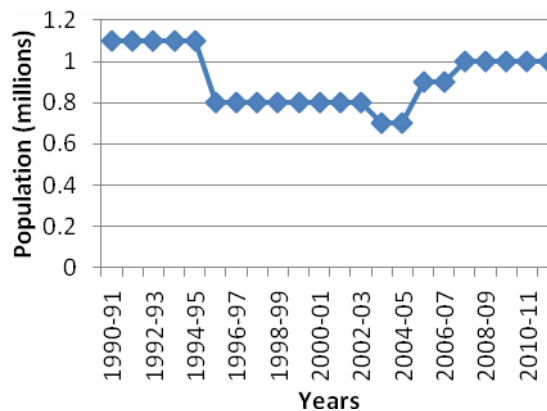
**Types and Breeds**

There are two types of camel found in Pakistan: 1- Mountain camels (locally known as Pahari or hill camels) are found in Northern Punjab and Baluchistan, 2- Riverine camels are found in the deserts and irrigated plains of Punjab and Sindh (Khan *et al.*, 2003). Qureshi (1986) reported there were 15 breeds in Pakistan. Qureshi *et al.* (1993) described eight breeds in Pakistan.

Later on Isani and Baluch (2000) and Younas and Iqbal (2001) have documented 20 breeds of camel in Pakistan comprising seven breeds of Balochistan (Brahvi, Kachhi, Kharani, Lassi, Makrani, Pishin and Rodbari), four of the KPK (Gaddi, Ghulmani, Khader and Maya), four of Sindh (Dhatti, Kharai, Larri or Sindhi and Sakrai) and five of Punjab (Marecha or Mahra, Bagri or Booja, Brella or Thalochoi, Mountainous or Cambelpuri and Kalachitta).

**Population trends in Pakistan**

Camel population has shown a dynamic trend over the last 22 (1990-2012) years. It includes negative and positive changes (Fig. 2). Population was 1.1 million in 1991-92 that remains same up to 1994-95 then there was a decline. It remained 0.8 million from 1995-96 to 2002-03. Then it again decreased and remained 0.7 million from 2003-04 to 2004-05. After that there was an increase in number and it remained 0.9 from 2005-06 to 2006-07. Then it again increases and remained 1 million from 2007-08 to 2011-12 (Economic Survey, 2011-12). Pakistan faced a severe decline of 29% in camel population between 1994 and 2004 while in whole of the Asia camel population is on decline (Rollefson, 2005).



**Figure 2:** Camel population dynamics during 1990-2011 (Source: Economic Survey of Pakistan, 2011-12).

**Socio-economic Importance**

According to Iqbal (1999) and Raziq (2009) camel has great socio-economic importance as it serves as a cheap source of draught in many fields. Camel is used in drawing water from wells; ploughing in the fields; leveling of land; working in mini oil extraction units; crushing sugarcane; grinding corn, wheat and other grains; pulling carts and transportation. Camel is also used for transportation of fuel, salt, wood and various agricultural products as well as pack animal. In hauling carts on an average camel can pull more than 3000 kg pack animal it can carry 300 kg for 5 hrs covering 25 to 30 km /day. Along with this it has the ability to survive in the adverse conditions of severe drought and in these conditions unlike other animals, very less mortality is present in camel (Khan *et al.*, 2003). Modern husbandry practices can improve the life of pastoralists in Pakistan in

terms of camel rearing. Considering the concept of global warming and drought conditions, camel is the only species which is reliable and can mitigate our work and food problems as well. It can upgrade the financial position of pastoralists and other farmers as well; as it fetches a good price (a mature and healthy camel fetches a price of 1-2 lacs). Indigenous camel which sustains its life in very difficult (pastoral and nomadic management systems), indirectly contribute to the economy. Camel survives in hot and harsh environment where survival of other livestock species is not easy. They browse horny shrubs and thorny bushes so have competition with any other livestock species regarding feeding requirements. Their hair and hides are used for making of blankets, tent cloths, ropes, floor mats, saddlers, sandals and many decorative articles. The woolly fleece of newborn camel calves are shorn once and used in manufacturing blankets by mixing it with hairs.

### **Production Systems**

Three major camel production systems are found in Pakistan which are nomadic, transhumant and sedentary. These production systems clearly depict the socioeconomic importance of camel as these are associated with climatic conditions, topography, plant phonology and water availability. Camel rearing in the nomadic systems is primarily linked to the social life of people. Nomads roam from place to place and the main reason for their roaming is lack of forage for grazing and water shortage problems, 26% of the camel herders in Pakistan follow this type of production system. This system has been characterized by three basic features: 1) Camel herds are diversified by sheep, goat and donkeys. 2) Seasonal and disaster migrations are obvious with main objective of survival. 3) Loaning and sharing of camel herds are the usual activities performed by these nomads. In transhumant system there is shifting of tillage operations in the rain fed area during the rainy seasons. The migration also depends on the fundamental objective of availability of feed and water. Twenty three % of camel herders are involved in transhumant system in Pakistan. Almost 50% of the people involved in the sedentary system for camel rearing that constitute the major proportion of household income. In this system women play a major role, they are not only involved in the rearing of camel but also convert the byproducts into useful products and market them.

### **Milk Production**

Pakistani camel is well known and famous for milk production (Table I). Marecha with an average milk yield of 4179 liters per year is probably the best milk yielder in the world with a lactation length of 270 to 540 days while total milk yield ranges from 1300 to 4200 liters. Regarding lactation milk yield Pakistan leads all other countries (India 2482; Somalia 1825; Tunisia and Algeria 1460; Ethiopia 1825) with an average lactation yield of 2920 liters (Fig. 3). While regarding per day production Pakistan also leads same countries (India 6.8; Somalia 5; Tunisia and Algeria 4; Ethiopia 5) with an average daily milk yield of 8 Kg (Fig. 4).

A well fed camel can produce 15-20 liters milk per day. Yasin and Wahid (1957) working in areas of poor fodder and in desert conditions reported the average yield as 4 liter per day. According to Aujla *et al.* (1998) heavy breeds of camel may produce up to 35 liters per day. Unlike other domestic species camel can maintain its average yield for a long time (at least for one year) with provision of adequate feed and water. Camel milk is rich in fat, protein minerals and vitamins especially in vitamin C. It's rich in phosphorus, therefore in many aspects; camel milk is superior to the milk of other domestic species (Qureshi, 1986). A comparison of camel milk with those of other species is shown in Table III.

Camel milk has higher shelf life due to a reason for having higher protein contents that performs an inhibitory action against certain bacteria. So it is easy to market it with basic hygienic conditions even in higher temperature (Yaqoob and Nawaz, 2007). Modern husbandry practices enables the camel farming as commercial dairy farming especially in areas of Cholistan rangelands and Thal and Thar deserts. Camel milk is consumed as such or is converted to yogurt (Abu-Ruqaie *et al.*, 1989). Camel milk has different sensory characteristics, and Pakistani camel especially has all the prominent dairy features that qualify it to be a good dairy animal. With the modern husbandry practices camel could be the source for future food production especially in arid, semi-arid, mountainous and desert areas. According to Baloch (2001) average milk production of Pakistani camel is 1894.93 liters per lactation with an average per day yield of 4.25 liters. Efficiency of camel is appraisable with the fact that it performs very well and gives good productivity even in those areas where the

survival of other animals is very tough, so it aids to the life of pastoralists as well as of nomads.

**Table I: Milk production and lactation length of Pakistani camels.**

Source	Average Daily Yield (Liter)	Lactation Length (month)	Lactation Yield (liter)
Sial (1950)	-	-	6688
Yasin and Wahid (1957)	10-15	16-18	2721-3629
Knoess (1977)	35	-	-
Knoess <i>et al.</i> (1986)	18.7	-	6688
Qureshi (1986)	8-10	-	-
Jasra and Aujla (1998)	4-12	9-18	1250-3650
Iqbal (1999)	11.66	12	4260
Baloch (2001)	4.25	15	1894.93
Khan and Iqbal (2001)	3.5-40	9-18	-
Raziq <i>et al.</i> (2008)	15-20	18	-
Raziq <i>et al.</i> (2010)	6-11.7	8	-
Ahmad <i>et al.</i> (2012)	8.17	-	-

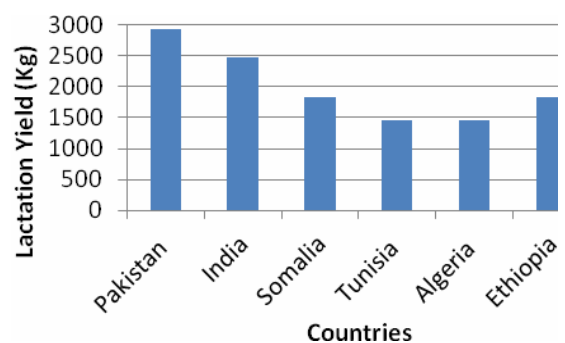
### Meat Production

Camel calves have excellent growth (daily weight gain) like other livestock species. Mostly the old and spent camels are slaughtered in Pakistan.

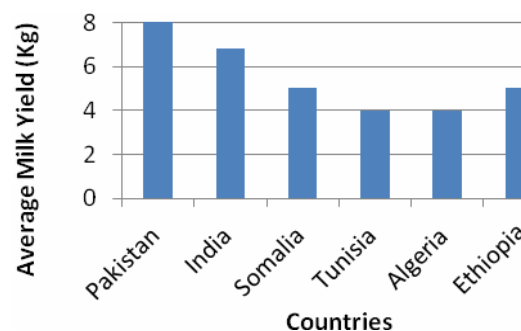
A few numbers of castrated camels are used for fattening purpose. Annual production of camel meat in Pakistan is 50,000 tons which valued Rs. 250 million (Khan *et al.*, 2003). Camel is also slaughtered blissfully at Eid-ul-Ezha by Muslims and thus camels fetch a good price. Camel meat market (except in Sudan) is not well developed in the world. However there are export opportunities to Saudi Arabia, Egypt, Libya, Gulf and other Arab states.

In Pakistan 70-75 camels are slaughtered daily in different slaughter houses excepting the meatless days. Meat of camel is consumed as fresh, in minced form and also in barbeques and sausages. The taste is similar to beef. Dressing percentage ranges from 45-55% (exceptionally 60%). Average slaughter weight is 395-660 kg and growth rate is 0.3-1.0 kg from birth to 1 year of age (Khan *et al.*, 2003). Growth rates in Pakistani camel calves in different studies (Tables I-VI).

Knoess (1977) and Qureshi (1986) reported 1.4 and 1.5 kg daily weight gain in male calves while 0.95 and 1.0 kg in female calves, respectively. Moreover Iqbal *et al.* (2001b) worked on growth patterns of camel calves at Barani Livestock Production Research Institute (BLPRI), Kherimorat district Attock and reported the daily weight gain of 0.75 kg in institute calves and of 0.82 kg in private farmer's calves, probably due to the reason that private owners give extra attention to their animals.



**Figure 3 Comparison of camel from different countries regarding lactation yield (Anonymous, 2012b).**



**Figure 4 Comparison of camel from different countries regarding per day average yield (Anonymous, 2012b).**

**Table II: Composition of camel milk in Pakistan.**

Source	Fat%	Protein%	Lactose%	SNF%	Ash%	Total solids
Iqbal <i>et al.</i> (2001a)	3.57±0.09	2.85±0.036	-	9.00±0.13	-	
Khan and Iqbal (2001)	2.9-5.5	2.5-4.5	2.9-5.8	8.9-14.3	0.35-0.95	-
Khan <i>et al.</i> (2003)	4.9	3.7	5.1	-	0.70	14.4
Raziq <i>et al.</i> (2011)	2.63	4.01	3.11	-	0.70	-

**Table III: Comparison of camel milk composition with those of other species (Khan *et al.*, 2003).**

Species	Fat%	Protein%	Lactose%	Ash%	Total Solids
Camel	4.9	3.7	5.1	0.70	14.4
Cow	4.5	3.8	4.9	0.72	13.9
Buffalo	7.6	3.8	4.9	0.78	17.0
Ewe	5.3	5.5	4.6	0.90	16.3
Goat	3.5	3.1	4.6	0.79	12.0
Mare	1.6	2.7	6.1	0.51	11.0
Ass	1.2	1.7	6.9	0.45	10.2
Elephant	15.1	4.9	3.4	0.76	26.9
Woman	4.5	1.1	6.8	0.20	12.6

**Hair and Hides**

A mature camel produces 1-3 kg hair per year which are used for making ropes, mats, bags, carpets and blankets. It also produces some fine wool (especially of first shorn in new born calves) that is used for making blankets. While its hides are used for making saddles and shoes. Usual price of its hide is 500-1000 rupees but in some case as 3000-5000 rupees when it is used for making table lamps (Khan *et al.*, 2003).

**Marketing**

Mostly the camel milk is used locally due to its production in far-off places (mountainous and desert areas), and thus cannot be transported to urban markets. But sometimes it is being sold in urban markets as a whole or mixed with milk of cattle and buffalo, especially in time when market demand increases than the usual supply (Yaqoob and Nawaz, 2007).

There is no established marketing system; mostly the sites used are the open grounds or the facing of other shops. Sometimes

the camel milk producers take their camels to major markets milked them and sold their milk to the end consumers. Their sale also occurs in exhibitions and local livestock ‘melas’. The poor marketing infrastructure encourages the middle man involvement so there is less profit or gains achieved by producers. Kachha and pakka dodhies purchase camel milk from producers mainly from villages at much cheaper prices, mixed it with milk of cattle and buffalo and then sale it at higher prices to the end consumers. Middle man can make 35-40% profit, due to that reason the producer is in greater loss (Mahmood and Rodriguez, 1993). The price of racing and well trained camel is between 1,50,000 to 2,00,000 Rs., while a milking camel may fetch a price of 1,20,000 (Ali *et al.*, 2009). While in meat condition animal fetches a good price of 1,00,000 to 1,50,000 and those which are slaughtered at Eid-ul-Ezha as 1,00,000 to 3,00,000. Mostly in common, at various marketing places, the camel is slaughtered weekly especially at Friday and the people from faraway places come there to take the camel meat.

**Table IV: Growth rate in Pakistani camel calves.**

Source	Daily weight Gain (Kg)	Camel calves
Knoess (1977)	1.4	Male calves
Knoess (1977)	0.95	Female calves
Qureshi (1986)	1.5	Male calves
Qureshi (1986)	1.0	Female calves
Iqbal <i>et al.</i> (2001a)	0.75	Institute calves
Iqbal <i>et al.</i> (2001a)	0.82	Private farmers' calves

**Issues and Threats**

High calf mortality, longer calving interval and gestation period, lack of proper farming and husbandry practices, diseases, absence of modern breeding techniques, poor management and non developed marketing infrastructure are the major issues in camel farming that hinder progress in camel industry.

**Conclusions**

In spite of the fact, that dromedary camel, an indigenous genetic resource, has been playing a pivotal role in the economy of pastoralists and nomads; it is severely neglected by the researchers and planners for development. There are sufficient evidences which prove that camel has unique attributes for food production in arid, semi-arid, mountainous and desert areas of Pakistan as well under intensive and extensive management systems.

Considering the prevailing drought conditions, decreased production of other animals, inflating population, green house effect and the changing scenario; camel represents considerable potential source for future food production. Camel potentials have not been fully exploited yet; it has many virgin areas of research by working on that we can bridge the gap between demand and supply in area of food production. By proper milk recording, selection and modern breeding tools; we can improve the economy of pastoralists. It is expected that this will bring a revolutionary change and further improvements in the food chain and economy of the country.

**Suggestions and Recommendations**

- There should be collaborative research with research institutes and other academic institutes mainly the agriculture universities.
- Registration of camel herds is also imperative.
- There should be establishment of camel health centre (Cholistan and Rakh Mahni) with main focus on Surra and Mange.
- Adoption of selection and application of modern breeding techniques are necessary to do farming at commercial basis.
- Organized marketing and fattening of males are need of the hour.
- Special incentives: Hardship allowance, rent free accommodation to the camel herders should be given.
- International collaboration is the key tool to achieve all the goals.

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