Camels of Cold and Hot Arid Regions

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Camels of Cold Arid Regions

The camels of cold arid region is named as *Camelus bactrianus* (double-humped camel). Bactrian camels are a source of superior quality of hair, meat and milk in addition to load carrying/haulage utility for people of cold arid region. The double humped camel is an important component of the cold desert ecosystem and to the people inhabiting in region of Nobra valley of Ladakh (Jammu & Kashmir) where the remoteness, inaccessibility and extreme climatic conditions of the area spell slow economic development. These areas are known as dust bowl and barren because not a single blade of grass grows during winter, however, there is a profuse growth of wild and cultivated plants during summer. Cold deserts have coarse, porous and immature sandy soil prone to wind and water erosion with influx of infra red and ultra-violet radiations, low atmospheric pressure of oxygen and carbon dioxide with low rainfall.

Breed characteristics of double- humped camel

The breed available in India is Ladakhi which is originated from Ladakh (J&K). The Ladakhi camels are short in height, compact with well built robust muscular body, long thick hair cover on body particularly at neck, shoulder, hump and mid-side region. The double-humped camel originated from Gobi desert of Mongolia. *Camelus bactrianus* comes under the Order Artiodactyla, Sub-order Tylopoda and Family Camelidae. The total World population is estimated at about 2.2 millions (FAO, 2005) most of which are confined in high land of central Asian countries like China, Mongolia, Turkmenistan, Kazakhstan, Uzbekistan and Afghanistan. A small population of about 105 camels is confined to Nobra valley of Ladakh (Sahani, 2002). The birth weight of bactrian camel varies from 30 to 40 kg. The body weight in adult camels varies from 350 to 650 kg and males were found to be heavier than females. The body colour varies from brown to dark tan. The body length varies from 170 cm to 178 cm in male and from 152 cm to 156 cm in female. The height at withers varies from 168 cm to 176 cm in male and from 152 cm to 156 cm in female. The heart girth ranges from 194 cm to 208 cm in male and from 192 cm to 199 cm in female (Sahani, 2002). In earlier times double-humped camel has served as a vital means of transport on the 6,400 km historic silk route. It was used to carry tea, silk and porcelain of China. Business men from Central Asian countries also used the camels to carry their merchandise to Ladakh and adjoining desert regions via the Karakoram pass. Double humped camels can easily thrive on natural resources which might otherwise be unusable.

Double- humped camel for people of cold arid region

One important aspect which is common to many places where camel inhabits is the utilization of its hair. Although draught use is the primary utility of Indian double-humped camel but hair is also being utilized by local communities just as in case of dromedary camels. Hair is used in village cottage sector for preparation of common utility items viz. rope, blankets, floor rugs, bags and mattresses etc. in Rajasthan and Gujarat (Sahani and Khanna, 1993). The hair and its products of this species can be an important source of additional income for camel keepers. The handicraft articles made up of camel hair, provide work to rural women in the field of grading of hair, tops preparation, spinning of hair, weaving, embroidery with 100% speciality hair and blending with sheep wool, goat hair, cotton and other products. The hair of camels is durable.

strong and has low conductivity (Mukasa, 1981). It has been estimated that a camel hair fabric of 620 gm weight will be as warm as a pure wool fabric of 900 gm weight (Khanna and Rai, 1991). The main body sites of hair coverage in bactrian camels are shoulders, mid portion of body, neck and hump regions.

This species gives return in terms of cash by draught, at the same time it gives sufficient milk to provide calories to the family of camel keepers and also protects them by providing all sorts of warm clothing and household items. The cost to the camel keepers for such items would otherwise be very high and out of reach. This requirement is being fulfilled by this animal in such a small form, which otherwise would go unnoticed. Small and marginal farmers in their own village and in their own house prepare blankets from the hair of adults and shawl from the hair of calves. Some of the traditional weavers charge Rs. 50 per kg for yarn making and Rs. 80 per kg for making blankets and shawl. These carpets and blankets are very cheap and durable. The life of a carpet is approximately 20 to 30 years and that of a blanket is 30 to 40 years. Camel hair is also used for making ropes, which are subsequently used for tying the animals and in making cots. Thus this species beautifully adjusts in the economics of a camel keeper in cold desert region.

Distribution status

The archeological survey indicated that the Persians and their northern and eastern neighbours were familiar with the double-humped camels, however, they were inclined to adopt the dromedary when they met it in their conquest of the West. As per previous record of double-humped camel have been found in northern Persia and Mongolia, Mesopotamia; on the Iranian plateau and in Turkistan. The double-humped camel had a wide distribution as a wild animal in central and north western Asia in pre-historic times. Russian travellers have reported existence of double-humped camel as wild animal and recent observation of a Russian expedition has confirmed this view that wild double-humped camels are still in existence.

Rearing systems for double humped camel

The double-humped camels are left open for grazing in forest of Nobra valley near the banks of river Shayok and Siachen round the year. The close in breeding activities are going on since earlier than last few decades. Presently these camels are reared under extensive system of management. They breed in natural condition with browsing and grazing in the rangeland all over the year. Nobody provides any supplementary feeding except for the few working camels and females during parturition for a short time period. Since salt availability is limited, so it should be provided for the well being of the species. As per the practice no herd men follow the camels in rangeland and they are supervised only according to their requirements. The lucerne/alfalfa locally called "Ole" is the main and only cultivated legume fodder, which also grows wild. Even people harvest certain wild plants and dry them properly for winter use. Legumes and grasses dominate the fodder plants. In addition, the fodder viz., oat (*Avena fatua*), Zamak (*Agropyron repens*) etc. are grown and generally utilized for feeding purpose.

Hair production from double humped camel

The hair of double humped camel and its products can be an important source of additional income for farmers inhabiting the cold arid region. The annual hair production of adult double humped camels varies from 3 to 4 kg per Indian animal, whereas annual hair production is 6 to 8 kg from bactrian camels of Mongolia and Kazakhstan. In China with a population of around 6.0 lakh double humped camels, the total annual production is around 1500 tones out of which about 600 to 800 tones is exported to other countries (Sahani, 2002). The longest, fines and densest fibers are from the shoulder region of the body of camel. The number of wool fibers per square cm of skin of a camel in good physical condition varies from 4000 to 4800, while the

number in an animal in poor condition is only a half of this number. The total yield of the male is about 30% higher than that of female bactrian camel. Bhakat *et al.* (2002) found lesser production in dromedary camel. The quality of the wool of the young animal is finer as compared to adult camel.

Milk production from double humped camel

The milk of bactrian camel is rich in vitamin C. It is an important source of milk supply for people living in the Gobi desert and steppe area of Mongolia. Camel's milk consumption in these areas makes up about 35% of the total food ration. Milk production potential of Indian bactrian camel varies, generally it is considered to be low in milk production (1 to 1.5 lt. day⁻¹) as compared to Indian dromedaries whereas the data of milk production of bactrian camel of Kazakhstan is as high as 6 to 7 lt. day⁻¹. The lactation length varies from 13 to 19 months and lactation yield varies from 500 to 1254 lt. The peak milk yield is obtained at around 3 to 4 months after calving.

Health hazards of double humped camel

The calf mortality is the major health hazard in this area. The higher mortality is mostly due to accidental ground such as drowning etc. in nearby rivers of Nobra valley in the new born calves as compared to adults. The common diseases prevalent in double-humped camels are contagious cough, vaginal and prepuceal myiasis, fungal disease caused by *Trichosporum capitatum*, Herpes encephalitis, diseases caused by *Thelazia leesi*, *Dictyocaulus cameli* and other common helminths, osteoporosis, senile plaques, influenza virus, multiple lipomas of liver and sub-clinical mastitis (Sahani, 2002). As compared to single humped camel skin affections and ectoparasite are not common in bactrian camel.

Utilization of double humped camel as meat animal

Bactrian camel meat may be another use of the species. It is not a common practice to eat camel meat in India, although it is used in substantial quantities in several other countries. Dressing percentage of camel carcass ranges from 40 to 60%. Camel meat contains about 22% protein and only 1% fat. It has been estimated that an average carcass weighing 210 kg would yield 10 kg fat, 160 kg meat and 40 kg bones and would thus yield 35 kg protein and 9973125 KJ energy which will be sufficient to meet the protein requirement of about 35 peoples (Wilson 1984). The optimum age for camel slaughter is around 3 to 4 years. Liu Zongping (2003) reported that in China bactrian camel are providing meat, hair, wool, hides along with indispensable means of transport.

Utilization of skin of double humped camel

The skin of bactrian camel may be used for making various type of leather goods and fancy items of public interest viz: shoes, sandals, purse, bag, stool cover, rope, jewelry box, toys and various decorative items etc. as utilized in case of dromedary (Bhakat and Sahani, 2004). In earlier era, camel's hides have utilized to make containers for storing and carrying water, oil and ghee etc. This hide is well suited for application of colour and in Rajasthan there is a tradition of making elaborately painted small container (*kuppi*) by using camel hide. It is having good export potential.

Utilization of bone of double humped camel

Bactrian camel bones may be used as important raw material for the manufacture of jewelry in some parts of the world. In India since ivory has been banned, it may be replaced by camel bone. Now a days ivory is replaced by dromedary camel bone and use for making toys, jewelry and camel long bone may be used for various decorative items. A few samples of various items are kept at camel museum, NRCC, Bikaner. It has potentiality as good as ivory but cost is

less as compared to that of ivory. The bone of double-humped camel is also used as bone-meal and fertilizer at cold desert region.

Utilization of dung of double humped camel

Dung ranks as an important by product. Camel dung is good source of organic manure and dry dung is also used as fuel. For farmers inhabiting cold desert barren territories, it can be the most important source of fuel and fertilizer. This dung can be sold by camel herd owner at good price. Camel keepers used to compensate the landowners by cash or by providing camel dung for overnight stays on their fields. Brick factories are also using camel dung as fuel.

Utilization of double humped camel as sport animal

In recent times, certain amount of money is involved and the economic importance as sport animal is increased. The safari and riding on double-humped camel is very much popular among tourists. In India camel dance is major attraction in this area. The tourist importance of double-humped camel is in increasing trend. The use of camel in marriage and other social programme have a great socio-cultural importance.

Camels of Hot Arid Regions

The camel of hot arid regions is known as *camelus dromedaries*. It possesses many unique qualities, which make it distinctly superior to other livestock. This "Ship of the desert" uses various adaptive mechanisms on hot arid sand dune. For instance cattle in the central desert of Australia with daily temperature of 40°C are reported to have died without water in four days while camels survived for more than 15 days in the same environment. It has been estimated that a well-fed camel could carry some six month's energy on it's back while cattle are unlikely to have more than two-three months, if run out of food. Camels are able to sustain up to 20 to 22% of body weight loss during severe famine conditions whereas other livestock like cattle and buffalo can not sustain beyond 10 to 12% loss in body weight (Wilson, 1984). Camel population in India has declined. It is due to fast mechanization, increased irrigation, shrinkage of grazing/browsing land of arid region (Bhakat *et al.*, 2008). Indian camel population is mainly confined to north-western states viz. Rajasthan, Gujarat, Haryana and Punjab which account for 93.12% of total Indian camel population with highest density (70.13%) of camel in eleven arid districts of Rajasthan.

Dromedary camel can tolerate high temperature, solar radiation and water deprivation and subsists on poor quality, thorny, vegetation. Camel milk has comparatively better keeping quality and medicinal properties. In recent times, camel hide and bone have been used for making various types of consumer goods and fancy decorative items. Camel dung is good source of organic manure and fuel. Draught use of camel carting is profitable and advantageous over bullock carting for small farmers. Camel also has better utility as riding, racing, ploughing livestock and it has economic importance as meat, marketing and game animal. As crop yields are low in arid desert because of erratic climate, the farmers of this region rely heavily on livestock enterprises for their sustenance. The livestock should be compatible with crop cultivation instead of competing with it for land and water resources. Camel rearing enterprise fits well with such requirements and it is regarded as a good resource for sustenance.

In changing climatic and social scenario the scientific utilization of camel bio-energy are as follows:

Different dimension of use of dromedary camel

The comparative study between camel and bullock carting systems (Bhakat and Sahani, 2001) reveals that payback period is almost double in case of bullock carting as compared to

camel carting, whereas cost-benefit ratio is 4th times higher in case of camel carting as compared to bullock carting. Due to short payback period and higher cost-benefit ratio camel carting is profitable and advantageous over bullock carting for small farmers. Indian camel can carry a load of 1.5 to 2 tons for 4-6 hour covering a distance of 30-40 km on two and four wheel cart without showing signs of distress (Rai and Raghvendar, 1994). It can work for 4 hrs at a stretch and 6 hrs with 2 hrs rest in between.

Camel can produce upto 1.16 hp energy during ploughing covering one hectare in 11 hours and can plough 500 sq. m hour⁻¹ at a depth of 16 inch. It can plough continuously for 3-4 hrs covering an area of 3000-3200 sq m (Rai *et al.*, 1991).

The slender riding camel can cover up to 100 km day⁻¹ at an average speed of 15-20 km hr⁻¹ over long period and stocky pack dromedary camel can cover 20-25 km day⁻¹ at an average speed of about 5 km hr⁻¹ and can carry burden of 200 kg on its back. The camel can travel 950 km in 29 days and can cover distance ranging from 24 to 70 km day⁻¹ at an average of 43 km day⁻¹ in a camel safari across the desert of Rajasthan (Khanna *et al.*, 1996).

Camel racing in the Gulf and certain Arabian countries is an important cultural event which emphasizes the bedouin traditions. The long limb length enables the pacing gait to maintain even at high speeds. This gait would therefore appear to allow greater mechanical efficiency and therefore speeds around 9-10 m sec⁻¹ to be maintained despite relatively low oxygen availability. There is a better race potential in Jaisalmeri than Bikaneri breed of camels and the female has been found to have better endurance than the male (Raghvendar and Sahani, 2000).

The camel corps contributes an important wing of Border Security Force of the Indian para military services and used for patrolling purpose in desert belt of the international border with Pakistan.

Utilization of dromedary camel milk

Camel milk possesses antimicrobial properties which has led to its use in sanatoria to treat cases of tuberculosis. Its therapeutic use in diabetes mellitus may be due to insulin activity. It has merit against some other chronic conditions viz: jaundice, anemia, asthma, piles. It has laxative effect on people unaccustomed to its drinking. Camel milk is sold as health food in Europe, particularly Germany and France. The composition of camel milk is different from milk of other livestock. It has low cholesterol, low sugar and high mineral (sodium, potassium, iron, copper, zinc, magnesium and free calcium) content. The high Vitamin C makes it as antioxidant thereby removing free radicals which may provide a stress-free status to its regular user. The milk protein has many characteristics similar to insulin and it does not form coagulum in acidic environment. This lack of coagulum allows the milk to pass rapidly through the stomach together with the specific insulin-like protein and remains available for absorption in the intestine. The camel milk fat has potential in development of natural food and cosmetics, as the milk fat is different from other animals. Milk of camel is considered as specially valuable in arid and semi-arid areas as it contains all the essential nutrients. There is much variation in customs of using camel milk as food. Since making curd from camel milk is difficult, the Raikas (a sub-caste of Rabaries) consume camel milk fresh (unboiled) or use it for making tea and occasionally 'kheer' (a sweet containing rice boiled in camel milk). Camel milk is also amenable to preparing products like flavored drink, kulfi, ice cream and sweets to prolong its shelf life as well as value-added tasty treats.

Unique features of dromedary camel milk

Camel milk is opaque white with normal milky odour, slightly salty or sweet in taste. Farmers prepare Kheer (a sweet boiled rice in camel milk) for their use at own household (Bhakat

and Pathak, 2009). Camel milk fat is lower in percentage terms as compared to cow and buffalo but it is spread throughout the milk in small micelles which make it easier to digest. Protein is present in sufficient nutritional quantities for human purposes. The shelf life of raw camel milk is 8-9 hours or much higher than cattle and buffalo milk. It can be further extended upto 18-20 hours at 37°C by activation of camel lactoperoxidase system. The concentration of lactoferrin and lysozyme in camel colostrum/milk is higher than bovines. Camel milk contains high concentration of vitamin C, higher percentage of calcium, salt and urea as well as micro minerals, making it a complete food. Vitamin C (ascorbic acid) gives the milk its sweet taste while at the same time brings about its low PH. The latter property stabilizes the milk and keeps it potable for relatively long periods. Special properties of camel's milk was the reason for man to take a milking camel with him to cross vast deserts. Camel milk is generally regarded as a tonic by the herdsmen. Beliefs in its healing qualities are widespread. Additionally, Arabs regard it as an aphrodisiac.

It is very essential to adopt scientific management practices to get efficient utilization of camel resources round the year for different purposes. It will also help in checking the alarming decline in camel population which while ensuring the conservation of this important component of the country's biodiversity. It will be for socio-economic improvement for people belonging to hot and cold regions.

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