

Camel Production and Management Systems in Different Agro-ecological Zones of Rajasthan

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Abstract: A study was conducted on various aspects of camel production and management systems in two agro-ecological zones of Bikaner and Pali. In a camel herd average representation of 1 to 4 year age group of camels was found to be less at Pali as compared to Bikaner district. The above 4-year-age group female camels formed maximum percentage in a herd of both the regions. Bikaner region was dominated by camel user (79.33%), where as in Pali district camel breeders formed the major group (65.33%). The main purpose of camel rearing was carting in Bikaner and trading in Pali district. The purpose of camel rearing significantly ($P < 0.01$) varied between two agro-ecological zones of Bikaner and Pali. In both regions camel keeper having single camel were maximum in irrigated belt as compared to un-irrigated area and farmers having more than 5 camels were more in un-irrigated region than irrigated belt. In both the regions farmers having single camel were rearing camel in intensive system. The farmers having 2-5 camels used to send their camel for grazing around village (upto 50 km range). Majority of farmers owning 5 camels, reared their camel by sending them in migration with some herds men. Chi-square test indicated that camel keeping pattern significantly ($P < 0.01$) influenced the rearing practices and feeding management system of these areas. In Bikaner region seasonal migration was more (84.75%), where as in Pali region prolonged migration was found to be maximum (79.32%). In both type of migration short distance (upto 50 km) covered was more in Bikaner region where as long distance covered (50 km) was more in Pali area. In both regions camel rearing was found to be 3rd source of revenue, rearing livestock's other than camel like cattle, sheep and goat were 2nd ways, whereas agriculture was the first source of revenue of farmers.

Key words: Camel, management, agro-ecology, production and economics.

The camel has unique adaptive characteristics to survive in the harsh conditions. They are able to sustain upto 20 to 22% body weight loss during severe famine conditions, whereas other livestock such as cattle and buffalo cannot sustain beyond 10 to 12% loss in body weight (Sahani and Mehta, 2004). It has been estimated that a well-fed camel could carry six months energy on its back (Khanna, 1986). The total world camel population is estimated to be 19.32 million, of which

India has 1.03 million (FAO, 2002). Since 85% of the gross cultivated area of Bikaner district is unirrigated, camel carts hold a significant potential for financing (Amresh Kumar, 1999). Heifer Project International, a private non-profit development agency is assisting tribal minorities who seek gainful employment using camel (Robert *et al.*, 1997). Evaluation of IRDP in the arid lands have indicated that average increase in the income of the beneficiaries was one of the highest among people who have taken

loan for the purchase of camel (Khanna, 1994). Singh (1999) reported that animals continue to be a major source of motive power (tractive and rotary) in India and used by the small farmers. The camel management practices vary depending on ecological conditions and cropping pattern of a particular area. Agro-ecological conditions viz., rainfall distribution, soil type, presence of vegetation are different in Pali and Bikaner regions. Pali district is situated in south central Rajasthan where average annual rainfall is 400 mm, maximum temperature is 43°C and minimum temperature is 7°C. Bikaner district is situated in north-western part of Rajasthan where rainfall is very scanty and temperature variations are extreme in summer and winter. In this district land is duny and soils are low in nitrogen and organic matter content. It is naturally eroded by winds during summer and crop yields are low and unstable. There is contrast in camel production and utilization pattern in barren, agriculturally less developed area (Bikaner) and comparatively fertile, intensively cultivated region (Pali). It is, therefore, necessary to investigate present camel management system, which is getting evolved in these areas to introduce ideal management practices appropriate to ecosystems and traditions applicable to specific region for economic upkeep of camels.

Materials and Methods

A survey was carried out on the camel production and management systems in two different agro-ecological zones of Bikaner and Pali districts. The required data were collected in suitably developed and pre-tested proforma by survey method. It

covered various aspects of camel production and management systems viz., social status of different categories of animal keepers, type of farmers, their agricultural activities, herd structure, purpose of camel rearing, camel keeping pattern, feeding management systems, camel rearing practices, type of migration, economic aspects of camel production, etc.

The respondents were selected out by using stratified random sampling in Bikaner, Lunkaransar, Nokha tehsils in Bikaner district and Pali, Desuri, Bali tehsils in Pali district. Five villages from each tehsils were taken. Out of 30 villages, 16 villages were drawn from un-irrigated area and 14 villages from irrigated area. A sample of 10 to 11 camel keepers was randomly drawn from each village for data collection. In all 300 camel keepers were interviewed.

The data collected were classified properly under different categories and statistically analyzed (Snedecor and Cochran, 1989). Spearmen's rank test was applied to study the variation in purpose of camel rearing. The Chi-square test was applied on various aspects of feeding management systems and rearing practices of camel. For economic analysis, all aspects of sources of income of camel keepers were considered.

Results and Discussion

Camels upto 1-year-age group formed about 18.32% in a herd maintained at Pali and 19.54% at Bikaner region (Table 1). Camels of above 4-year-age group were less in Pali as compared to Bikaner region as camel keepers of Pali region sell out their camel before they attain 4 year age

Table 1. Composition of camel herd structure in Bikaner and Pali

Region	Sex		Age groups (year)			Overall
			Upto 1	1-4	Above 4	
Pali (n=150)	Male	Av.±SE	1.10±1.00	1.33±1.21	1.37±1.11	3.80
		%	8.88	10.73	11.06	30.67
		Overall (%)	18.32	27.68	54.00	12.39
	Female	Av.±SE	1.17±1.01	2.10±1.43	5.32±2.46	8.59
		%	9.44	16.95	42.94	69.33
		Overall (%)	18.32	27.68	54.00	12.39
Bikaner (n=150)	Male	Av.±SE	1.23±1.11	1.38±1.26	1.31±1.20	3.92
		%	9.69	10.87	10.32	30.88
		Overall (%)	19.54	28.44	52.02	12.69
	Female	Av.±SE	1.25±1.16	2.23±1.49	5.29±2.48	8.77
		%	9.85	17.57	41.70	69.12
		Overall (%)	19.54	28.44	52.02	12.69

while in Bikaner region camel keepers kept their camels upto 4-5 years.

Khanna (1994) found that in Bikaner district herd has 80% females. Large camel herds are owned by Raika/Rabri community. In Bikaner region camel users were 79.33% whereas in Pali region camel breeders were 65.33%. Camel users are the farmers/Rabaries who utilize camel mainly for drought purpose for livelihood. They generally do not breed camels. Camel breeders produced offspring and rear for few years and sell them in livestock fair to earn money. Camel breeders do not normally utilize camels for draught power. Camel users come from a wide variety of social backgrounds, such as Saansi, Meghwal, Mina, Bhil, Kalbelia who aspire to camel ownership. For these groups camels are valuable income-producing assets. These users are dependent on breeders for the supply of camels. Breeders own larger numbers of female camels, which are kept mainly for the purpose of reproduction. Sahani (2001) reported that in cultural and social context of camel breeding, Indian

camel owners can be categorized as camel users and camel breeders. In Bikaner region farmers were rearing camel mainly for carting followed by farming operation, trading, riding, safari, pack loading and other purposes (Table 2). In Pali region farmers were rearing camels mainly for trading purpose. This was followed by pack loading, riding, safari, carting, farming use and other purposes. Spearman's rank test was applied and rank correlation value was found to be significant which indicated that the purpose of camel rearing varied significantly ($P < 0.01$) in Bikaner and Pali districts. Other uses of camel included decorative/show use, breeding stock of camel for exchange during marriage interaction etc.

The Pali district is having more irrigated land as compared to Bikaner region. Camel management varies in these two agro-ecological regions. The main crops are pearl millet, sorghum, mustard, rape, wheat, corn, sesame, cotton, chickpea, clusterbean, barley and groundnut. The cultivated crops of Bikaner region are mostly millet

were common in Pali district. Camels grazing around villages were at short distance, which enabled the herdsmen return back to village within short period. Most of the middle size herds were kept under this system. On the other hand large camel herds were mostly kept under a migration, herdsmen stayed at night with animals in the rangeland and did not return to their villages for several days since the distance was long.

Farmers having one camel, follow intensive system for feeding their animal in Bikaner (81.25%) and Pali (81.67%) region. Most of the farmers having 2 to 5 camel preferred to feed their animals by semi-intensive system of management in both Bikaner (55.56%) and Pali (60.00%) regions. Maximum farmers maintaining more than 5 camels generally follow extensive system of management in Bikaner (52.17%) and Pali (60.00%) regions. The Chi-square test indicated that camel keeping patterns were significantly ($P < 0.01$) influenced by the feeding management system in both the regions. Tandon *et al.* (1992) reported that in Gadwala village, camels were sent for grazing from November to June in groups of 100-200 camels to nearby areas where natural forage and water was available.

It appears stall feeding practices are increasing while camel herd size is declining. A feed of crop by-products (stall feeding) is given to camels. Stall feeding and grazing on pasture land were combined for large herds since one or two camels were often kept at farm either permanently or occasionally for agricultural operations (carting and or ploughing). The farmers

under this combined management system only supplemented to working animals, whereas limited farmers supplement females in early lactation, calves and weak or diseased animals. Concentrates were also given to working camels and sometimes to females in early lactation, weak animals and to stud camels by a large number of farmers. Concentrates were mostly molasses, oil (from groundnut or sesame), and ghee (butter oil processed from milk) and sometimes cereals, pulses, moth bean, clusterbean, phalgati, alum (hydrated aluminium potassium sulphate). Water was provided to camels one to three times a day by most of the farmers. Very few provided water less than once every two days and upto once a week during winter in the farthest villages. Water was always provided daily to working camels. Bhakat and Sahani (2000) reported that primary activity of camel keepers was agriculture in villages (95.00%) and city areas (84.16%). For camel keepers, agricultural activities were considered to be the major source of income. This was followed by rearing of cattle, buffalo, sheep and goat. Camel rearing was considered to be third major source of income.

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