

ECONOMIC VIABILITY OF CAMEL BREEDING ENTERPRISE IN SOUTHERN RAJASTHAN

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ABSTRACT

Camel breeding is a source of employment for Raika community in southern Rajasthan. Primary survey of camel breeders (n=75) revealed that for more than 90% of sample households camel breeding was the main occupation with average herd size of 21.06 units of camel. Traders dominated camel marketing as more than 80% animals were sold in the village itself through them who take these animals for further sale in Pushkar, Jhalrapatan, Kasba Thana and other livestock fairs of Rajasthan state. The major demand of camel comes from farmers for use in agricultural operations, carters for transportation of goods and dairy owners selling camel milk. Average net return worked out per camel household per year was ₹1.01 lakh with B:C ratio of 1.99. The camel herding was found financially viable enterprise in southern Rajasthan with a payback period of 03 years, positive Net Present Value (NPV), and Internal Rate of Return (IRR) of 55.73%. The value of IRR was about 04 times higher than camel breeding enterprise in arid region of Rajasthan due to opportunity to sell camel milk in southern Rajasthan.

Key words: Breeding, camel, cost, investment, management, marketing returns, southern Rajasthan

Camel (*Camelus dromedarius*) is a major source of livelihood and income for camel breeding communities' viz. Raika and Sindhi muslims etc. in Rajasthan state of India. It can survive and reproduce under a management system with low inputs, harsh environmental conditions and difficult landscapes in arid and semi-arid regions where survival of other animals is usually at risk (Schwartz, 1992; Köhler-Rollefson, 1997). It has a unique ability to convert the scanty plant resources of the desert into milk, meat and fibre (Rathore, 2001). The use of camel for transportation of goods/building material/farm produce in different regions of Rajasthan is a common practice and thousands of families earn their livelihood from this enterprise (Kaushik *et al*, 1991; Kohler-Rollefson, 1992; Gahlot and Chada, 2000). However, the continuously decreasing population of camel in Rajasthan and country has been burning issue for the stakeholders. Chand *et al* (2010) reported camel breeding as profitable enterprise in the desert and desert margin districts of Jaisalmer and Pali. However, southern Rajasthan, which have quite a large camel population, as it is gifted with the Aravali range, has a fair cover of forest and provide better grazing resources for camel breeding, but the economics of camel breeding in this region has not been studied yet. The paper presents results of a study conducted among camel breeder in southern Rajasthan with an aim to find out the economics of camel breeding in this region.

Materials and Methods

Sampling and data collection

In Southern Rajasthan, the camel breeders mainly resides in Udaipur, Dungarpur and Banswara, hence these districts were selected for present study. A multistage stratified random sampling technique was used to draw the sample (n=75) for this investigation with at least 10 camel per family. The secondary data were collected from various reports and state animal husbandry department of Rajasthan. Primary data related to investment on camel and other permanent items, feeding practices followed round the year, supplemental feed, health management of animals, age at sale of camel calves, place of sale, value of animals sold, and losses if any etc. were collected for the period 2010-12 from selected respondents. Both personal interview technique and group discussion method was followed for collection of data. Key informants interviews were also conducted to know in detail the overall camel breeding practices. The collected data were scrutinised; tabulated and analysed by employing tabular analysis, regression analysis and project evaluation techniques etc.

Data analysis

The economics of camel production was found out by simple tabular analysis. The data collected

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were coded, digitised and analysed using MS Excel package. Standard enterprise budgeting methods were used for calculating variable and fixed cost of camel production (Johl and Kapur, 2009). Fixed cost included both interest and depreciation on capital investment. Variable expenses included grazing cost, material cost, veterinary expenses and labour cost etc. As labour was the major item in the variable cost, opportunity cost was assigned to the graziers and other family labour. Actual amount paid to hired labour was directly taken into variable expenses. The financial viability of camel production was assessed using project worth measures such as Net present value (NPV), Pay-back period, Internal rate of return (IRR) and Benefit-cost ratio (BCR); computed using the standard methods (Gittinger, 1982).

Results and Discussion

Socio-economic profile

The information on socio-economic profile of sampled households was collected on different parameters such as caste, education, family type and size, occupation, division of labour etc. A majority of sample households had nuclear (52%) families which indicated similar trend in other occupations in the rural society. Average family size was 5.82 with ratio among male and female was 51 and 49%, respectively (Table 1). The rebari/ raika were the dominating caste in southern Rajasthan for camel rearing. Rajput and Tripathi (2009) reported 77% of Raika family belong to nuclear and rest of the belong to joint family system, 66.67% respondent families had 5-8 members and 23.33% families had up to 4 members in arid region of Rajasthan.

Education

The majority of the respondents were literate (37.33%) followed by primary (26.67%) and middle education status (18.67%), respectively (Table 1). Patel *et al* (2008) also reported about 90% Kutchi camel breeders in illiterate category and only 2.7% and 1.35% had education up to primary or secondary level, respectively. Rajput and Tripathi (2009) also reported 40% of the respondents as illiterate, 55% up to primary and middle and the education level of rest 5%, respondents was up to 12th standard, which is similar to present study.

Family occupation

Camel husbandry was found to be the major occupation amongst (96%) families, 4% families, however, had agriculture as their primary occupation.

Marketing of camel and camel milk were the other 2 main activities. Rajput and Tripathi (2009) reported camel husbandry and agriculture as major occupation of 28% and 45% families, respectively. In southern Rajasthan, Raika's main occupation was camel husbandry.

Table 1. Demographic features of sample households (n=75).

Particulars	Category	South Rajasthan (n=75)		
		Frequency	Per cent (%)	
• Caste	1. Gen	0	0.00	
	2. OBC	75	100.00	
	3. SC/ ST	0	0.00	
	4. Jat, Muslim	0	0.00	
	Total	75	100.0	
• Schooling	1. Illiterate	28	37.33	
	2. Primary	20	26.67	
	3. Middle	14	18.67	
	4. Secondary	11	14.67	
	5. Graduate	2	2.66	
	Total	75	100.0	
• Family	1. Nuclear	39	52.00	
	2. Joint	36	48.00	
	Total	75	100.0	
• Family size	o Male	1. Adult	1.85	31.79
		2. Child	1.13	19.41
	Sub Total		2.98	51.20
	o Female	A. Adult	1.84	31.62
		B. Child	1.00	17.18
	Sub Total		2.84	48.80
	Total		5.82	100.0

Cropping pattern

Camel breeders had more area under rainfed crops in kharif season. Major crops grown in Kharif season were maize (35.44%) and cluster bean (11.26%) (Table 2). Farmers cultivated wheat (22.33%) and mustard (5.02%) crops in rabi season to meet their family consumption requirements. Maize and wheat are the staple food of the people of southern Rajasthan. Some of the most important crop rotation systems followed in this region was maize-wheat and cluster bean-wheat.

Composition of sample camel herds

Camel keepers in the study area mainly reared female animals for reproduction purpose and young

male calves with age of 1 to 2 years were sold. On an average a camel breeder had 21 units of camel in southern Rajasthan, which comprised of more than 80 per cent female animals in a herd (Table 3). These findings are similar to composition of camel herds in arid region of Rajasthan (Chand *et al*, 2010) but with higher herd size 36.8 units of camel, which comprised of 85% female animals. Overall value of camel herd (animals) was ₹ 4,11,464 in which the share of male and female was 13 and 87%, respectively.

Table 2. Cropping pattern of camel breeders (n=75).

Crop	South Rajasthan	
	Area (ha)	Percent
<i>Kharif</i>		
• Maize	0.61	35.44
• Sesame	0.08	4.47
• Cluster bean	0.19	11.26
• Sorghum	0.04	2.60
• Pearl millet	0.00	0.00
• Pulses	0.04	2.33
• Fodder (GRASSES)	0.22	12.93
• Others	0.01	0.56
Sub total	1.19	69.59
<i>Rabi</i>		
• Wheat	0.38	22.33
• Mustard	0.09	5.02
• Gram/Pulse Crop	0.04	2.51
• Others	0.01	0.56
Sub total	0.52	30.42
Grand total	1.72	100.00

Note: 1 ha land is equal to 6.25 bigha in selected districts of southern Rajasthan.

Investment pattern

Fixed investment on a camel herd mainly comprised of animals as its share in total investment was more than 97% (Table 4). The camel herders keep bare minimum items with them as they frequently move from one place to another. The proportionate investment on equipment and bedding etc was found to be 2.6%. Investment on an average camel herd in arid region was ₹ 7, 29,093 in which animals alone accounted for about 99.5% (Chand *et al*, 2010). It is evident that cost of female animals was the most important component of total fixed capital investment. Breeders of southern Rajasthan did not have any investment on enclosure as animals stay in forest/common area and farmers' field for grazing. In case of equipments only few utensils were kept for collecting milk and making tea while BHAKAL

(Carpet made of camel wool) was also kept for using as bed during night.

Table 3. Composition and value of camel on sample herds (₹ / herd).

Particulars	No.	Value (₹)
• Male		
< 1 yr	2.18	23,591
1-2 yr	1.69	1,562
2-4 yr	0.08	4,213
> 4 yr	0.17	52,238
Sub total	4.11 (19.52)	22,872 (12.70)
• Female		
< 1 yr	2.20	20,933
1-2 yr	1.86	25,171
2-4 yr	2.12	39,197
> 4 yr	10.76 (51.11)	2,73,925 (66.57)
Sub total	16.95 (80.48)	3,59,226 (87.30)
Grand total	21.06 (100.00)	4,11,464 (100.00)

Table 4. Investment pattern on camel herds (₹ / herd).

Items	Southern Rajasthan	
	Amount (₹)	Per cent
A. Animals	4,11,464	97.4
<i>i) Male</i>	52,238	12.4
<i>ii) Female</i>	3,59,226	85.1
B. Manger and Enclosure	0	0.0
C. Equipment, beddings and others	10,820	2.6
Total	4,22,284	100.0

Resource use pattern and management

Land utilisation pattern and irrigation

Average size of operational holding of camel breeders in southern Rajasthan was found to be 1.23 ha with majority (55%) belonged to marginal category and cultivated by owner's family. Rajput and Tripathi (2009) reported 13% camel owners in landless category and traditional camel breeders in Kutch district of Gujarat has very low land holding according to Patel *et al* (2008). Kohler-Rollefson (1992) pointed out that Raika gradually being forced out of their traditional occupation because of their landlessness. Camel breeders were more dependent on income from sale of camel calves and camel milk. As camel was not reared on stall feeding, breeders did not cultivate crops keeping in view the camel production.

Housing management

Camel breeders do not create any housing structure for their animals. In all the selected areas of southern Rajasthan, camel remains in forest/common areas or farmers' fields round the year. In rainy season, animals were kept inside the forest land, hillocks or farmer's fields near forest area. The front legs of camel were generally tied with ropes during night time to check their movement but breeding male camel was generally kept free so that it can identify the female in heat and have mating. A good number of families (18.33%) were also living in huts. Only 5 families had *pucca* houses that too belonged to large farmers' category. Rajput and Tripathi (2009) also reported that majority of Raika families (46.67%) were residing in mixed type of houses followed by those spending their live in *kutch*a or mud houses (27%).

Human labour utilisation

Adult male labour (1.25 units) was employed for camel rearing since animal was to be kept outside village round the year. On an average proportion of family and hired labour was recorded 80 and 20%, respectively. The role of women members was almost negligible as they did not move with herd during local grazing or at the time of migration like in case of small ruminants' migration. Labour was hired either if the herd size was big and family labour was not able to handle it or it was mainly needed in winter season when maximum calving took place and extra manpower is required to take care of young calves. Besides maximum camel trade took place in winter due to organisation of livestock fairs in this season, help of hired labour was required either in transporting animals to fair site if herd owner himself was moving to fair site for sale of animals or take care of animals at village itself. Chand *et al* (2010) reported an average proportion of family and hired labour of 84 and 16%, respectively in a study of arid region with leading role of adult male labour for camel rearing. Saini *et al* (2006) also reported similar practice in various camel rearing areas of Rajasthan. Rajput and Tripathi (2009) mentioned role of male and female members of Raika families in various outdoor as well as indoor camel husbandry related activities. The male members performed work like taking camel to grazing pastures, ploughing land, carting, training to camel and milking operations were performed by male members of families. Treatment of sick animals through indigenous preparation, grooming, watering, cutting and transportation of fodder for camels were

performed mostly by male members of Raika families where the involvement of females in such activities was found almost negligible.

Breeding and calf management

Camel breeders follow natural breeding method and for a herd of 30-40 females one breeding male camel was maintained. As average number of adult females in the herd was about 11 to 21 animals, herd owners shared the use of breeding male camel to economise on cost account. Chand *et al* (2010) in a survey of arid region of Rajasthan found one breeding male for 50 females in a camel herd. The breeding male camel was replaced/exchanged with other herds after 4 years to check inbreeding in the herd, indicating that breeders were well aware about the disadvantages of inbreeding in the herd. The selection criteria for breeding camel included mother's milk yield, well built body, body colour, hump thickness, thin skin, long and thin leg, size of chest pad, scrotum position, length and development etc. Camel calves were reared with herd only.

Feeding/ browsing management

In southern Rajasthan, animals were taken for browsing in forest area in rainy season and in summer and winter season to fallow cultivated land. The distance of browsing area could be about 25 to 300 kms away from the breeder's village. During rainy season about ₹ 100 per camel was paid to forest department as penalty and animals were taken for browsing for 4 months. During rainy season, due to cultivation of crops in farmers' field, breeders take utmost care that standing crop was not damaged by the animals and they stay with their animals either in forest area or farmers' field in the vicinity of forest land. Farmers offer free food, tea and tobacco to camel breeders who keep their herd in their fields during night stay. It helped in enriching the farm soil by camel droppings and urine. The most nutritive and fodder plants/trees preferred by camel in forest area of southern Rajasthan were Dhawra (*Anogeus* *latifolia*), Khair (*Acacia catechu* L), Arjia (*Acacia leucophloea*) and Pharangari/Frangan (*Grewia flavescens*), Selpa/Selpa (*Securingea leucopyrus*) (Willd.) Muell. Arg., Arni (*Clerodanron multiflorum*) Lin., Ber (*Ziziphus moritiana*) etc. Some other trees browsed by camel were Dhak (*Butea monosperma*), Golra (*Lannea coromandelica*), Salar (*Boswellia serrata*), Gangan (*Grewia tenax*), Hingota (*Balanitesae gyptiaca*), Kumatia (*Acacia senegal*), Kankeda (*Maytenuse marginata*), and Kaanti (*puncture vine*) (*Tribuluster restris*) etc. Besides browsing in the field, animal is offered mustard

oil, turmeric, gur (jaggery) etc. after calving. Camel was also given salt at 10 days interval to fulfil its mineral requirement. These fodder trees generally consumed by camel are rich in CP and minerals (Singh and Saini, 2002). Saini *et al* (2006) also reported that majority of camel rearers give salt to camel, however, Rathore (1986) indicated that salt is not given to camels except medicinal dose because salty flora of desert meet the requirement of salt (Choudhary, 1994). The intensive discussions with camel breeders of the regions indicated rapid decline in grazing land available for camel. Camel breeders do not have access to traditional grazing lands, which are now under the jurisdiction of forest department. Village gocher lands (common grazing lands), were also declining due to encroachment as well as degradation due to lack of community management.

General upkeep of animals

For drinking water, animals were generally dependent upon village ponds and cattle troughs (common cemented open tanks), in which water is supplied from public water supply. Camel were also taken to water structures (*Avalas*) made by farmers to quench their thirst. Frequency of watering to camel was thrice in a day during summer season while in winter season it was once or twice in day. During rainy season, animals were not taken to water source as they were free to drink water collected at various places in forest area. An adult camel required 20-40 litres of water per day. Animals were generally milked in the early morning and in the day time whenever required by breeders. Generally, knuckling method is used for milking of animals. Wool shearing activity was done collectively like a festivity and one person could shear wool of 4-5 camel in a day.

Migration pattern of camel breeders

Camel breeders of southern Rajasthan migrated to Gujarat and Madhya Pradesh (M.P.) in search of better forage resources. They stayed outside for 6-8 months. Migration period started with the onset of winter. They stayed there with their animals until monsoon. With the onset of monsoon, they moved back to their native areas. The movement was along traditional fixed routes. If the native region did not have sufficient rainfall during rainy season than camel breeders delayed their return journey and stayed at forest area of neighbouring states until grazing condition was favourable for their animals. During migration only male members of the family moved with animals while the women and older

members of the family were taking care of children and agricultural activities on their farms.

Health management

Trypanosomosis (Surra), abortion, camel pox (Mata), ectoparasites (Ticks), mange, maggot wound, enteritis, lantana poisoning, eye laceration, pica (Sand licking) and rumen impaction, were most common health problems prevailing in the camel herds of southern Rajasthan. There was same trend in the intensity and incidence of various health problems during the period of 3 years. The incidence of some diseases might have been prevented by following proper vaccination schedule and timely treatment in consultation with veterinary doctors. It was found during field surveys that delay in proper treatment was also one of the major causes of mortality in camel. The camel breeders rarely contacted veterinary doctors for treatment it was due to lack of access to veterinary facilities and other the doctors were also not fully conversant with treatment of camel diseases.

Cost and returns in camel production

Fixed cost

Average fixed cost worked out per year for a camel herd in southern Rajasthan was ₹ 52,277. The interest component had 2/3rd shares in the total fixed cost. The fixed cost of the animals was the major item of fixed cost due to comparatively higher investment on animals (Table 5). Chand *et al* (2010) reported an average fixed cost per year of ₹ 74,155 for a camel herd (36.80 animals) in arid districts of Rajasthan which was higher in comparison to southern region. The share of interest and depreciation in the total fixed cost was around 59 and 41%, respectively. These results are in contrary to bovines where farmers spend on animal sheds and utensils and that also contributes to fixed cost.

Maintenance cost

The average cost of maintaining a camel herd in southern Rajasthan (21 animals) was ₹ 1, 02,935. Chand *et al* (2010) reported average cost of maintaining a camel herd of ₹ 1, 17, 225 in arid region. The proportion of fixed cost was about 50% in total cost of maintaining a camel herd. The higher share of fixed cost was contrary to bovines where variable cost had higher share in the total cost as these animals were stall fed while in case of camel management labour is the major component with more than 25% share in the total cost (Table 6).

Table 5. Fixed cost/ year in camel production (₹/ herd)
n = 75

Particulars	Amount (₹)	Per cent (%)
I. Interest (12%)		
o Animals	33,376.50	63.84
o Others	1,298.40	2.48
Sub total	34,674.90	66.33
II. Depreciation		
o Animals	15,438.53	29.53
o Others	2,164.00	4.14
Sub total	17,602.53	33.67
Total (I+II)	52,277.43	100.00

Note: Depreciation on animals is calculated for adult females with Junk value of ₹ 2,500/- only. The normal age of female is 20 years and depreciation is taken from 5 year onward i.e. for 16 years. As young animals appreciate in value and male are generally sold, so no depreciation is taken for these animals. Depreciation on other items like utensils etc is taken @ 20% per annum.

Table 6. Maintenance cost per camel herd per year (₹) n =75.

Particulars	Southern Rajasthan	
	Amount (₹)	Per cent
1. Variable cost		
A. Grazing charges to forest department	1,093.00	1.06
B. Material cost	11,869.98	11.53
Fodder (Neem)	2,732.50	2.65
Concentrate and oil	9,137.48	8.88
C. Veterinary Expenditure	7,366.82	7.16
D. Labour cost	30,327.95	29.46
Labour for grazing and Gen Mgt.	30,000.00	29.14
Wool shearing	327.95	0.32
E. Total variable cost (A+B+C+D)	50,657.75	49.21
2. Fixed cost		
A. Interest	34,674.90	33.69
B. Depreciation	17,602.53	17.10
Total fixed cost (A+B)	52,277.43	50.79
Total cost (1 + 2)	1,02,935.18	100.00
Family labour cost	24,262.36	

Returns

Average net return worked out per herd per year was ₹ 1,01,451 in southern Rajasthan (Table 7). Family labour income per camel herd per year was ₹ 1,25,713/- with B: C ratio of 1.99, it indicates that camel rearing was a profitable venture. Maximum share in the returns was value of milk consumed at home or sold in market. Camel breeders usually sell male calves of more than one year old to fetch better price. Chand *et al* (2010) reported a B: C ratio

of 1.33 in camel rearing in arid region of Rajasthan. Rajput and Tripathi (2009) reported that the income of majority of the respondents (55%) ranged between ₹ 3000 to 5000 per month; about 13% of the families had their earning even less than ₹ 3000, it indicated low income status of camel rearing households. The findings indicated significant role of opportunity to sell camel milk as camel breeders had more than 50% contribution from camel milk in the gross earnings from this enterprise.

Table 7. Returns from camel (₹/ herd/ yr).

Particulars	Amount	Per cent
A. Sale of animals and value addition in calves	70,276	34.38
B. Other income	1,34,123	65.62
i. Milk value	1,07,913	52.80
ii. Income from wool	3,074	1.50
iii. Estimated food value received free from farmers	19,200	9.39
iv. Camel dung value	3,935	1.93
C. Gross returns	2,04,386	100.00
Total variable cost	50,658	
Fixed cost	52,277	
D. Total cost	1,02,935	
E. Net returns	1,01,451	
F. Returns over variable cost (ROVC)	1,53,728	
G. B:C ratio	1.99	
H. Family labour income	1,25,713	

Financial viability of camel production

The financial viability analysis of camel production indicated a Payback period of 4 years for southern Rajasthan. The camel production was financially viable at 12% discount rate in terms of both NPV and BCR criteria, as NPV was positive and BCR greater than one. The IRR that indicates the maximum paying capacity of the camel rearing was estimated to 56% for southern Rajasthan. It implies that it would be financially viable to invest in camel production. The annuity value of camel production was ₹ 3,29,299/- in this region that indicates income generating capacity of the camel enterprise. Chand *et al* (2010) reported IRR estimates of 14.69, 12.71 and 10.94% in Marwar Jn., Bali and Fatehgarh tehsils, respectively in arid Rajasthan and these figures were too low compared to Southern Rajasthan. Gross B: C ratio calculated was also found higher than unity confirming that camel breeding enterprise was profitable in this region. Thus, it is obvious that traditional camel rearing enterprise despite several hardships to breeders was financially viable in southern Rajasthan.

Table 8. Measures of investment worth per camel herd (₹)

Particulars	Value
1. Pay-back period (years)	4.00
2. Net present value at discount rate of 12% (₹)	23,44,485
3. Internal rate of return (IRR) (%)	55.73
4. Annuity value at 12 per cent discount rate	3,29,299
5. Gross benefit-cost ratio at 12% discount rate	3.07

Although traditional camel breeding enterprise in southern Rajasthan is profitable and provides gainful employment to camel breeders, in comparison to other options/ professions, it is less attractive on account of drudgery involved and also less gainful employment days. The younger generation of camel breeders are showing much less interest to continue with this enterprise. Restriction on entry in forest area is emerging as a major problem for breeders, especially during rainy season as options for grazing are limited in other areas in this season. Regulated access to forest for grazing on participatory basis, enhanced opportunity to sell camel milk and mobile veterinary facility to camel breeders is expected not only to generate additional returns to camel breeders, but it may help in improving their socio-economic conditions and sustenance of this enterprise.

References

Chand K, Jangid BL, Rohilla PP and Kachhawaha S (2010). Economics of Camel Production in Rajasthan. *Journal of Camel Practice and Research* 17(1):15-20.

Choudhary BR (1994). *Camel Behaviour, Production and Management*. Archanalok Prakashan, Bikaner, Rajasthan.

Gahlot TK and Chada BP (2000). Training and sport of the

dromedary camel. In: Gahlot TK (ed.) *Selected Topics on Camelids*. The Camelid Publisher, Bikaner.

Gittinger JP (1982). *Economic Analysis of Agricultural Projects*. John Hopkins University Press, Balitimore, USA.

Johl SS and Kapoor TR (2009). *Fundamentals of Farm Business Management*, Kalyani Publishers, New Delhi.

Kaushik SN, Gangawar AC and Kaushik CR (1991). Economic analysis of bullock and camel power use on farm in Haryana. *Indian Journal of Animal Production and Management* 7(8):132-37.

Köhler-Rollefson I (1992). The camels of India in social and historical perspective. *Animal Genetic Resource Information* 10:53-64.

Köhler-Rollefson I (1997). New hope for the Raikas of Rajasthan. *Livestock International* 1(1):11-14.

Patel MK, Wadhvani KN, Patel KS, Trivedi MM and Patel AM (2008). Social Profile of camel pastoralists in Kutch district of Gujarat. *Journal of Camel Practice and Research* 15(1):127-130.

Rajput DS and Tripathi H (2009). Camel husbandry practices followed by Raika pastoralists under semi intensive system in Bikaner district of Rajasthan. *Indian Journal of Animal Sciences* 75(11):1307-1313.

Rathore GS (1986). *Camels and their management*. Indian Council of Agricultural Research, New-Delhi.

Rathore HS (2001). Saving the camel in Rajasthan. *Ecology and Farming* 27:16-17.

Saini N, Kumar R, Kiradoo BD, Singh N, Bhardwaj A and Sahani MS (2006). Camel rearing practices- A survey study in arid western agro-ecosystem of Rajasthan. *Journal of Camel Practice and Research* 13(2):179-184.

Schwartz HJ (1992). Productive performance and productivity of dromedaries (*Camelus dromedarius*). *Animal Research Development* 35:86-98.

Singh GP and Saini N (2002). Role of anaerobic fungi in fibre digestion and its special significance to camel nutrition. *Indian Dairyman* 54(9):64-68.