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IMPACT OF CAMEL PRODUCTION SYSTEM ON THE SUSTAINABILITY OF MARGINAL FARMERS IN HOT ARID VILLAGES OF THAR DESERT

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ABSTRACT

A grass root level survey was conducted on various aspects of camelid farming which involved four different zones (north, south, east, west) of Thar desert. The required data were collected in the suitable developed and pre - tested proforma from Raikas of Thar desert. In this region the camel to other herbivore (cattle, buffalo, sheep and goat) ratio was 1:21.36. Among the different camel health disorders, Parasitic mange case was highest. It was followed by Trypanosomiasis, general fever, respiratory infection, other problems like digestive disorders, worm etc. The mortality in camel calf (<1 year age) and adult were 33.05±2.63% and 8.10±1.07%, respectively. The average annual productivity of commonly grown. Thar desert crop were 4.89q/ha for guar (*Cyamopsis tetragonoloba*) and 2.75q/ha for moth(*Phaseolus aconitifolious*). The final returns per upit (Rupee) invested was high in case of guar (Rs. 3.36) as compared to Moth (Rs. 2.29). The average cost of rearing of draft camel was low as compared to cattle and buffalo. The final return per unit (Rupee) invested was high in case of camel (Rs. 1.90) as compared to cattle and buffalo (Rs. 1.82) in Thar desert. It is evident that due to higher production potential, increase market price and economic advantage guar cultivation for camel farmers is more profitable than moth cultivation and camel rearing is also profitable as compared to other livestock rearing in terms of per unit investment.

INTRODUCTION

India is a highly populated country with 32 states/ UT's with 81 regions having their varying regional perspective. .The total population that nears 1000 million with 50% females among them, with 46% people are between the age group of 19 yrs and 60 yrs i.e they are eligible to be in employment but the opportunity of organised employment (salaried jobs) are limited to less than 3% and about 70% of country's population is dependent on agriculture/animal husbandry (Singh.2000). As crop fields are low in desertic land, because of recurrent drought the farmers of the region rely heavily on livestock enterprises for their sustenance. Animal husbandary under such degraded lands can be successful only if the livestock are basically a stable protective resource having long term viability employment- absorbing capability and income generating capacity. The livestock should be compatible with crop cultivation instead of competing with it for land and water resource. Camel rearing enterprise fits well with such requirements. The total world camel population is estimated to be 19.286 million of which India has third highest camel population of 1.52 million (FAO, 1998) after Somalia and Sudan. Indian camel population is mainly confined to northwestern states viz: Rajasthan, Gujrat, Haryana and Punjab (93.12% of total Indian camel population) with highest intensity of camel in eleven arid district of Rajasthan (70.13% of total Indian camel population) (Khanna *et al.*, 1990). In India nearly 41.4 per cent of the country's total landmass of 3.28 million sq. km falls in the category of arid (11.8%) and semi- arid (29.6%) zones. Camel is associated with social culture of the societies inhabiting in the dry lands. Marketing of camel is an important trade in the Rajasthan where it is widely used as draft animal. Camel carts continue to play a crucial role in the farm economy as a cheap mode of short distance transportation of different agricultural commodities. Since 85% of the gross cultivated area of the Bikaner district is non-irrigated camel carts hold a significant potential for financing (Amresh Kumar 1999).

Camel power for farming use is more economical than a pair of bullocks and in the sandy terrain the camel energy is not only cost effective but also profitable and remunerable. Kohler- Rollefson (1992) focused on Raikas breeders of Rajasthan. Rapid change in agroecological condition and industrialisation in the recent past has its impact on camel management practices. In order to obtain optimum profit from camel, it is essential to adopt scientific management practices.

MATERIAL AND METHODS

Data collection : The required data were collected in the suitably developed and pre- tested proforma by survey method during the year 1999 - 2000. This grass root level survey covered various aspects of camel rearing system viz. social status of camel keepers, ongoing agriculture practices, number of livestock, their camel breeding practices, Commonly occurring diseases, health status, production aspects and sources of revenue of camel keepers etc.

Sampling Procedure: The selection of respondents was made by using stratified random sampling technique. The study involved a total of five different villages which are representing five tehsils of Bikaner and Churu district. Five different tehsils were categories into four different zone of Thar desert, viz: Nokha tehsil (South zone), Lunkarensar tehsil (North zone), Kolayat tehsil (West zone) and Sri Dungargarh tehsil (East zone). A sample of 11 to 14 households were drawn from each village randomly for data collection.

Economic analysis: To obtain the estimates of rearing cost of animal and cost of crop cultivation, the opportunity cost of owned inputs and actual prices paid by the farmers for purchasing inputs were considered. To work out the gross returns from different source of income of farmers, the market prices were considered. Finally, the economic estimates were carried out by tabular analysis.

RESULTS AND DISCUSSION

The socio-economic status of camel keepers as well as communication and transport infrastructure are also very poor. In these districts land is duny and soils are low in nitrogen and organic matter content. It is naturally eroded by winds during Summer and the crop yields are low and unstable. Some of camel keepers follow a transmigratory system of animal management. Animal husbandry in this region depends not only on the economic and social aspects of the migrating farmers but also on the ecological and agrostological aspects of land use management.

In this study the average family size of camel farmers ranges from 5.25 ± 1.33 to 8.54 ± 2.66 with overall average of 6.70 ± 0.59 individuals. The overall number of female members are 3.49 ± 0.26 where as male members are 3.21 ± 0.36. The literacy percentage varies from 26.22 to 32.11. Most of camel keepers are having maximum non-irrigated land. The overall average land holding was 29.90 ± 1.01 ha/farmer (Non irrigated) and 15.22 ± 1.02 ha/farmer (irrigated). Among the different categories of farmer marginal farmer formed the major group (92.50 to 96.14%) and few progressive farmers (3.86 to 7.50%) are also there. National sample survey 1991-92 indicates that there are 62.8% marginal farmers and 17.8% small holders. There had been a steady decrease in the size of land holding per person (Singh 2000). It was observed that under village condition the female members of farmers family devoted maximum time (81.85%) as compared to male members (18.15%) with day to day management of camel. The major crop of kharif season are guar, moth, bajra, mung, til etc. where as under irrigated belt, the rabi season's crops are mustard, chana, wheat etc.

The ratio of camel to other livestock species in different villages of Thar districts are presented in Table - 1.The camel to sheep &

goat ratio was highest followed by cattle ratio and buffalo ratio. Similar trend was also observed by Tandon *et al.* (1996). Some experts have suggested that the population cattle, buffalo, sheep & goat should be reduced to the optimum level and that camel based livestock system should be encouraged in the periphery of desertic land. In that event there will, in all probability, be no loss to the land, food and milk production as camel will cause much less damage to the ecology than other livestock (Khanna and Rai 1990).

Table 1. The ratio of camel to other livestock species in different villages of Thar districts.

Maximum	Camel : Sheep & Goat	1: 12.45
	Camel : Cattle	1: 8.56
Minimum	Camel : Buffalo	1: 0.31
Overall	Camel : Herbivore	1: 21.36

Camel Production System: The most useful animal of desert ecosystem - camel can tolerate high temperatures, Solar radiation and water deprivation and subsists on poor quality thorny vegetation. The overall average annual ploughing by camel was 22.46±1.76 days during *kharif* season and 24.19± 1.61 days during *rabi* season. It depends on land holding of camel farmers. The overall average of utilisation of camel in ploughing was 10.15±0.36 hr/day in *kharif* season and 9.26±0.44 hr in *rabi* season. In this study area average milk yield varied from 3.5±0.50 to 4.80±1.12 kg/day and the lactation length ranged from 8.65±0.86 month to 11.27±0.43 months. The average annual hair yield in camel calves was found to be higher as compared to that of adult. The overall average for camel calve was 1.39±0.17 kg and for adult camel was 0.97±0.25 kg.

The overall average of dry fodder consumption of an adult camel was 6.43±0.23 kg/ day during day time where as 5.61±0.22 kg/ day during evening time. The average time spend in ranged land for pasture grazing varied from 6.25±0.43 hrs/day to 10.54±0.31 hrs/day. The frequency of watering was twice in summer and once in rainy and winter season. As a special feeding farmers supplemented Molasses (300 to 700 gm), oil mainly of groundnut / seasame (250 to 600 gm), Alam (hydrated Aluminum potassium sulfate salt) (250 to 600 gm). Occasionally ghee, methi, haldi is also offered to their studs and breeding females and to their cart camel. The average number of services required for conception varied from 1.78±0.28 to 2.56±0.27. Maximum responded (72%±4.86) reported common breeding season/rutting months is from December to March where as few farmers (28%±4.94) reported is from November to March.

Camel Health Disorder: Frequency distribution of different health disorders and mortality in camel of different zones of Thar districts are presented in Table - 2. The first ranking is obtained by parasitic mange with overall frequency of 75.62%±1.80. It indicates that, in this study area parasitic mange problem of camel was maximum/highest. This is in consistence with Laval *et al.* (1997). In south zone of Thar desert this problems is maximum (80.14%). The occurrence of surra (Trypanosomiasis) varied from 11.20% to 15.00% and this case was found mainly in irrigated area. It is followed by other health disorders. General fever is getting III ranking with overall frequency of 4.86±0.55. Incidence of Respiratory infection (Pneumonia , coughing etc) got IV ranking and this problem was highest (5.70%) at western zone. Other health problems like digestive disorders, diarrhoea, worm infestation etc. occurred with range from 2.12% to 3.80%. No prophylactic measures were adopted in villages against parasitic or bacterial diseases. Although treatment against mange with Butox spray or ivermection injection was reported from villages of south and east zone. The aver-

age annual mortality in young camel calves (up to 1 month age) was maximum as compared to adult camel. The overall average annual mortality in young calves was 33.05%±2.63 where as in adult, it was 8.10±1.07. As ethnoveterinary practice camel farmers used mobile oil/ kerosine oil/ sesame oil and boric powder against mange infection, Alcohol + Onion for general fever and Azoan + Molasses for coughing problems.

Table 2 . Frequency Distribution of different health disorders and mortality in camel of different zones of Thar districts.

Zones(Tehsils)	South (Nokha)	North (Lunkaransar)	West (Kolayat)	East (Dungargarh)	Overall	Ranking
Types of Disorders(%)						
Parasitic Mange	80.14	73.44	72.11	76.77	75.62±1.80	I
Surra	11.20	15.00	12.24	12.71	12.79±0.80	II
General Fever	3.52	5.21	6.15	4.57	4.86 ±0.55	III
Respiratory Infection Pneumonia,(Coughing etc.)	2.99	3.35	5.70	3.83	3.96 ±0.60	IV
Other Problems (Digestive disorder, Worm etc.)	2.15	3.00	3.80	2.12	2.76 ±0.40	V
Death Rate(%)						
Adult	5.23± 1.44	9.15± 1.50	10.16 ± 2.61	7.86± 3.05	8.10± 1.07	II
Calf (<1yr aged)	28.26± 2.55	35.56± 3.51	39.24± 2.11	29.13± 2.13	33.05± 2.63	I

Economic Analysis of Camel keepers: The productivity of two major crop commonly grown in this study area and their cart of cultivation along with return in presented in Table- 3A. The per hectare productivity of guar was higher than moth. The average cart of cultivation were Rs. 3200/ha and Rs. 2525/ha for guar and desi moth respectively where as gross return from guar was higher than moth. Return per rupee invested was higher in guar (Rs. 3.36) as compared to desi moth (Rs. 2.29). The same trend was observed in case of net return. From this study it is evident that due to higher production potential, increase market price and economic advantage guar cultivation for camel keeper is more profitable than traditional moth cultivation.

Table 3A. The Average economic return of camel keepers from agriculture

Major Crop	Aveg. Productivity(Q/Ha)	Aveg. cost of Cultivation. (Rs./Ha)	Gross Return (Rs./Ha)	Net Return (Rs./Ha)	Return /Rupee Invested (Rs.)
Guar	4.89	3200.00	10758.00	7558.00	3.36
Desi Moth	2.75	2525.00	5775.00	3250.00	2.29

The economic return of camel keepers form animal husbandry is presented in Table - 3B. The major return from different animal sources are taken for economic calculation. The average return from cattle and buffalo was 10 kg milk/day animal and from sheep was 2.50 kg wool/year/animal where as camel delivered return through carting. The average cost of rearing of camel was comparatively low as compared to cattle and buffalo. The sheep were reared in zero input basis (mainly on kitchen waste/grazing land). The net return from cattle and buffalo was high (Rs. 45/day/animal) as compared to camel (Rs. 36/day/camel). The similar trend was observed in case of gross return. Return per rupee invested was high in case of camel as compared to cattle and buffalo. This is mainly due to low rearing cost of camel than cattle & buffalo. Khanna and Rai (1994) suggested to encourage camel

as draft animal in arid regions. Saley (1993) reported that the main objectives of camel rearing in Rajasthan is obviously animal power for pulling a cart or ploughing. Rama *et al.* (1997) reported that the livestock farming has more or less been steady in spite of several severe droughts that the region experienced in recent years. There is a need for capital generation and row material production for the industry to survive. An increase in demand for animal products in the urban consumer market is expected. C.M Singh (2000) suggested that the only source that is sustainable would be the small holder who generates products at moderate cost, without draining natural resources and depending on import.

Table 3B. The Average economic return of camel keepers from animal husbandry

Animal	Average Return	Aveg. Cost of rearing (Rs./ani/day)	Gross Return (Rs./ani/day)	Net Return (Rs./ani/day)	Return / Rupee Invested(Rs.)
Cattle&Buffalo	Milk-10 kg/day/ani.	55	100	45	1.82
Sheep	Wool - 2.50 kg/Yr/Ani	0	213/Ani/Yr	0.58	-
Camel	Carting	40	76	36	1.90

(Market prices fetched by the farmers for calculating the gross return is taken as Guar @ Rs. 2200/Q, Moth @ Rs. 2100/Q, Milk @ Rs.10/kg, and Wool @ Rs. 85/kg).

CONCLUSION

In view of many natural impediments, mainly the climatic conditions and poor soil moisture regine , the Thar desert appears to be more suitable for livestock farming than crop farming. Therefore, to ensure a regular income and sufficient food for farmers and better living standards , it is necessary to go for some other alternate land use-based farming system or subsidiary enterprises, which will provide more income and employment to the farmers. Such enterprises include camel rearing/ carting or other species. It holds practical values for cost effectiveness, sustainable environmentally friendly and socio culturally acceptable. The main advantage of this study is to create awareness among the otherwise ignorant farmers regarding the usefulness of camel in carting. The idea of sustainability of agriculture and livestock production revolves around better utilisation of time, money, resource and family labours of the farmers. So there is a sign of hope to explore the income through camel carting that exists for turning the farmer's economy viable.

REFERENCES

Amresh Kumar (1997) Potential linked credit plan National Bank For Agriculture and Rural Development, Bikaner Distt, Bikaner P-21.

FAO (1998) Production Year Book, Rome, Italy.

Khanna, N.D. *et al.* (1990) *Indian J. Anim. Sci.* **60**:331-337.

Khanna, N.D.and Rai, A.K. (1994). *Indian Farming* **44**(3):23-27.

Khanna, N.D.and Rai, A.K.(1990) *Indian Farming* **40**(6):33-35.

Kohler- Rollefson (1992). The Raikas dromedary breeds of Rajasthan: A pastoral system in crisis nomadic people, 30:74-83.

Laval, G. *et al.* (1997) Bench mark survey of camel keeping in Bikaner and Jaisalmer district of Rajasthan, NRCC, Bikaner, pp-36-49.

Rama, B.D.*et al.* (1997). Livestock and wild life management in Indian Arid Ecosystem Book Desertification control in the arid Ecosystem of India for sustainable Development : pp327 - 333.

Saley, M. (1993). Survey of draught camel for carting in an Indian desert town Bikaner and investigation on draught performance of Bikaneri Camel. Bikaner,India NRCC,66P.

Singh, C.M. (2000). Small holder and conventional system : Important components of A holistic Application of reproduction biotechnology in India. Paper presented at VCI conference, Jan: 30 - 31,2000, NewDelhi.

Tandon, S.N. *et al.* (1996). Annual Report (1995-96) NRCC : pp 36-40.