Sustainability of pastoralists through camel management in hot arid Thar desert

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Camel-carts continue to play a crucial role in the Indian farm economy as a cheap mode of transportation of different agricultural commodities. In Thar region the ratio of camel to other herbivore (cattle, buffalo, sheep and goat) 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 viz. digestive disorders, worm etc. The average annual productivity of commonly grown Thar desert crop were 0.489 tonne/ha for clusterbean (*Cyamopsis tetragonoloba*) and 0.275 tonne/ha for moth (*Vigna aconitifolia*). The final return per unit (Rupee) invested was high in clusterbean (Rs 3.35) as compared to moth (Rs 2.29). The average cost of rearing of draft camel was low when compared with cattle and buffalo. The final return per unit (rupee) invested was high in camel (Rs 1.90) when compared with cattle and buffalo (Rs 1.82) in Thar desert. Due to higher production potential, increase market price and economic advantage clusterbean cultivation for camel farmers is more profitable than moth cultivation, and camel rearing is also profitable when compared with other livestock rearing in terms of per unit investment.

Key words: Camels, Farm management, Pastoralis, Sustainability

THE CROP FIELDS are low in desertic land, because of recurrent drought the farmers of the region rely heavily on livestock enterprises for their sustenance. The camel pastoralists are those populations whose livelihood is based largely on camel production. The animal keeping is their major occupation and at times diversify into keeping other livestock mainly sheep, goats and cattle and involving agricultural operations. Their vocation is suited to the availability and exploitation of natural resources. In the arid and semi-arid lands, the crop farming is undependable and least productive. 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. Marketing of camel is an important trade in the Rajasthan

Fig.1. Camel used in carting operation.

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Fig.2. Camel pastoralist collecting animal hair production from camel.

where it is widely used as draft animal. To obtain optimum profit from camel, it is essential to adopt scientific management practices.)

The grass root level study covered various aspects of camel rearing system viz. social status of camel keepers, on-going agriculture practices, number of livestock, their camel breeding practices, commonly occurring diseases, health status, production aspects and sources of revenue of camel keepers etc. The required data were collected in the suitably developed and pre-tested proforma by survey method.

The selection of respondents was made by using multistage stratified random sampling technique. The study involved a total of 5 different tehsils of Bikaner and Churu district. Five different tehsils were categories into 4 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 20 households were drawn from each village randomly for data collection.

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.

Animal husbandary in the Thar region depends not only on the economic and social aspects of the

migrating pastoralists but also on the ecological and agrostological aspects of land use management. The socio-economic status of camel keepers as well as communication and transport infrastructure are also very poor. In these districts land is dunny 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 pastoralists follow a trans migratory system of animal management.

In this study the average family size of camel pastoralists 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 whereas male members are 3.21 ± 0.36 . The literacy percentage varies from 26.22 to 32.11. Most of camel pastoralists 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 pastoralists marginal farmer formed the major group (92.50 to 96.14%) and few progressive farmers (3.86 to 7.50%)

Table 1. The average economic return of camel pastoralists from agriculture.

Major crop	Average productivity (tonne/ha)	Average cost of (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Return/ invested (Rs)
Cluster bean	0.489	3 200	10 758	7 558	3.36
Desi moth	0.275	2 525	5 775	3 250	2.29

Table 2. The average economic return of camel pastoralists from animal husbandry.

Animal	Average return	Average cost of rearing (Rs/animal/ day)	Gross return (Rs/animal/ day)	Net return (Rs/animal/ day)	Return/ invested (Rs)
Cattle and Buffalo	Milk - 10 kg/day/animal	55	100	45	1.82
Sheep	Wool - 2.50 kg/yr/animal	0	213/ Ani/Yr	0.58	
Camel	Carting	40	76	36	1.90

(Market prices fetched by the farmers for calculating the gross return are taken as cluster bean @ Rs 2200/q, Moth @ Rs 2100/q, milk @ Rs 101/kg, and wool @ Rs 85/kg).

are also there. National sample survey 1991-92 showed that there were 62.8% marginal farmers and 17.8% small holders. There had been a steady decrease in the size of land holding per person. The female members of pastoralist's family devoted maximum time (81.85%) under village condition as compared to male members (18.15%) with day to day management of camel. The major crop of *kharif* are clusterbean, moth, pearl millet, mung bean, rapeseed etc. whereas under irrigated belt, the *rabi* are mustard, chick pea, wheat etc.

The ratio of camel to other livestock species in different villages of Thar districts were analysed. The camel to sheep and goat ratio was highest (1: 12.45), followed by cattle ratio (1:8.56) and buffalo ratio (1:0.31). The overall camel and herbivore ratio was 1 : 21.36. The population cattle, buffalo, sheep and goat should be reduced to the optimum level and that camel based livestock system should be encouraged in the periphery of desertic land. There will be no loss to the land, food and milk production as camel will cause much less damage to the ecology than other livestock.

CAMEL PRODUCTION AND MANAGEMENT SYSTEM

The overall average of dry fodder consumption of an adult camel was 6.43 ± 0.23 kg/ day during day whereas 5.61 ± 0.22 kg/ day during evening. The average time spend in ranged land for pasture grazing varied from 6.25 ± 0.43 hr/day to 10.54 ± 0.31 hr/day. The frequency of watering was twice in summer and once in rainy season and winter. As a special feeding farmers supplemented Molasses (300 to 700 g), oil mainly of groundnut/seed (250 to 600 g), Alam (hydrated Aluminum potassium sulphate salt) (250 to 600 g). Occasionally *ghee*, fenugreek, turmeric are 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 ($72\% \pm 4.86$) reported common breeding season/ rutting is from December to March whereas few farmers ($28\% \pm 4.94$) reported from November to March.

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* and 24.19 ± 1.61 days during *rabi*. It depends on land holding of camel farmers. The overall average of utilization of camel in ploughing was 10.15 ± 0.36 hr/day in *kharif* and 9.26 ± 0.44 hr in *rabi*. 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 to 11.27 ± 0.43 months. The average annual hair yield in camel calves was found to be higher when compared with its adult. The overall average hair yield for camel calf was 1.39 ± 0.17 kg and for adult camel was 0.97 ± 0.25 kg. Camel hair is used in village cottage industry for preparation of common utility items viz: rope, blankets, floor rugs, bags and mattresses etc. The handicraft articles made up of camel hair, provide work to rural women in grading of hair, tops preparation, spinning of hair, weaving, embroidery with 100% specialty hair and blending with sheep wool, goat hair, cotton and other products. The camel hair is widely used in rural cottage industry of Rajasthan and Gujarat for preparation of various items. The hair of dromedary camels are durable, strong and have low conductivity.

HEALTH OF CAMEL

The average annual mortality in young camel calves was maximum when compared with adult camel. The average mortality camel calves (up to 1 month age) varied from

$28.26\% \pm 2.55$ to $39.24\% \pm 2.11$ whereas the average mortality of adult camel varied from $5.23\% \pm 1.44$ to $10.16\% \pm 2.61$. The overall average annual mortality in young calves was $33.05\% \pm 2.63$ whereas in adult, it was $8.10\% \pm 1.07$. The first ranking is obtained by parasitic mange which was varied from 72.11% to 80.14% with overall frequency of $75.62\% \pm 1.80$. The area parasitic mange problem of camel was maximum/highest. In south zone of Thar desert this problems was maximum (80.14%). The occurrence of *Surra* (Trypanosomiasis) varied from 11.20% to 15.00% with an overall frequency of $12.79\% \pm 0.80$ and it was found mainly in irrigated area. *Surra* was followed by other health disorders. General fever was getting III ranking which was varied from 3.52% to 6.15% with overall frequency of $4.86\% \pm 0.55$. Incidence of respiratory infection (pneumonia, coughing etc) got IV ranking and this problem was highest (5.70%) at western zone. It varied from 2.99% to 5.70% with overall frequency of $3.96\% \pm 0.60$. Other health problems like digestive disorders, diarrhoea, worm infestation etc occurred with a range from 2.12% to 3.80% and a overall frequency of $2.76\% \pm 0.40$. No prophylactic measures were adopted in villages against parasitic or bacterial diseases. Although treatment against mange with Butox spray or Ivermectin injection was reported from villages of south and east zone. As ethnoveterinary practice camel pastoralists used mobile oil/kerosene oil/sesame oil and Boric powder against mange infection, alcohol + onion for general fever and azoan + molasses for coughing problems.

ECONOMIC ANALYSIS OF CAMEL PASTORALISTS

The success of livestock rearing revolve around communications network, efficient labour organization, functionally prescribed norms and social values of religious beliefs, gender role delineation and technolo-

gical consideration. The pastoral production system must be analysed from various aspects viz. pastoral economics, social and organizational structures integrated to each other. Any analysis of camel pastoralism modes of production should focus on all these aspects of peoples live as these relate to each other and to the entire ecology of their habitat. The productivity of two major crop commonly grown in this study area and their cost of cultivation along with return etc were meticulously analysed. The average economic return of camel pastoralists from agriculture is elucidated in Table 1. The per hectare productivity of clusterbean (0.489 tonne/ha) was higher than *desi* Moth (0.275 tonne/ha). The average cost of cultivation were Rs 3 200/ha and Rs 2 525/ha for clusterbean and *desi* Moth, respectively whereas gross return from clusterbean was higher (Rs 10 758) than moth (Rs 5 775). A similar trend was found in net return. clusterbean provides higher net return (Rs 7 558) than *desi* moth (Rs 3 250). Return per Rupee invested was higher in clusterbean (Rs. 3.36) when compared with *desi* moth (Rs 2.29). Due to higher production potential, increase market price and economic

advantage clusterbean cultivation for camel pastoralist is more profitable than traditional moth cultivation.

The economic return of camel pastoralist from animal husbandary was also analysed. The average economic return of camel pastoralists from animal husbandary is given in Table 2. The major return from different animal sources were 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 whereas camel delivered return through carting. The average cost of rearing of camel (Rs 40) was comparatively low as compared to cattle and buffalo (Rs 55). 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) when compared with camel (Rs 36/day/camel). The similar trend was observed in gross return. The gross return from cattle and buffalo, sheep and goat, camel were Rs 100/animal/day, Rs 213/animal/year and Rs 76/camel/day, respectively. But finally return per rupee invested was quite high in camel (Rs 1.90) as compared to cattle and buffalo (Rs 1.82). This is mainly due

to low rearing cost of camel than cattle and buffalo. The main objectives of camel rearing in Rajasthan is obviously animal power for pulling a cart or ploughing or as draft animal in arid regions. 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 raw material production for the industry to survive. An increase in demand for animal products in the urban consumer market is expected. 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.

SUMMARY

To ensure a regular income and sufficient food for pastoralists and better living standards, it is necessary to go for some other alternate land use-based farming system or sub-diary enterprises which will provide more income and employment to the pastoralists. Such enterprises include camel rearing/carting or other species. So there is a sign of hope to explore the income through camel production that exists for turning the pastoralist's economy viable.

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Productivity constraints of...

awareness, the sowing distance was not followed by the farmers. Very minor proportion of farmers followed the proper spacing. The reasons reported for non-adoption of sowing distance are the non-availability of required implements.

The fertilizer application at the sowing was adopted by one-third sample farms. The reason behind non-adoption of fertilizer at the sowing was risk due to uncertain monsoon (47%).

Measures for improvement of productivity of *rabi* sorghum

(i) The efforts are required to be

made for adoption of complete package of production technology through proper and intensive extension programme.

- (ii) Removal or minimization of the constraints of economical, technological, agro-climatological and other nature.
- (iii) Suitable high-yielding varieties and hybrids need to be developed, propagated and spread.
- (iv) Development of drought-resistance varieties and better methods of water conservation to face vagaries of monsoon.
- (v) Expansion of irrigation facilities

to provide protective irrigation to enhance productivity.

SUMMARY

Rabi sorghum is the largest cereal crop grown in Maharashtra being ideal for rainfed regions. The low productivity in the state and regional variation in yield is the most limiting factor for enhancing production. The awareness of package of practices of *rabi* sorghum among the grower and adoption of the same needs to be enhanced through constant research, extension and induced input supply of right quality as well as quantity and at optimum time.