Camel — a better alternative than bullock system in Thar desert

Champak Bhakat¹ and D Chaturvedi²

National Research Centre on Camel, Bikaner (Rajasthan) 334 001

Draught animals play a crucial role in India's economy by providing gainful employment and regular flow of income to the farmers. The supplementary and complementary connection between the crop and livestock sector add to the importance of maintaining draught animals. A detailed economics of both type of farming systems was analyzed by using the linear programming method. The average age (years) of camel and bullocks used under farming system were 6.43 ± 0.98 and 4.12 ± 0.76 , respectively. Annual average net income from kharif season crop was observed to be higher in camel system as compared to bullock system. In the study area maximum camels were reared under intensive system, followed by semi-intensive and extensive system of holdings. The chi-square test showed a significant ($P < 0.01$) influence of categories of farmers on management practices of camel and bullock. The farming use of bullock system required higher expenditure in terms of interest on investment, depreciation and expenses towards insurance of animals. The overall total fixed cost was higher in bullock system (Rs 2 605) than camel system (Rs 2 088). Annual expenditures towards hired and family labour, repair and maintenance of animal-drawn implements and miscellaneous expenses were almost the same in both types of farming systems, whereas maintenance cost (feeding and health cover) of bullock system was higher as compared to camel system. The overall total variable cost was quite high in bullock system (Rs 56 306) as compared to camel system (Rs 37 442). The average earning from selling of manure was more in bullock system than camel system, whereas income from other sources and profit was higher in camel system than bullock system. The pay back period for investment on animal system was quite less in case of camel than bullock but the cost : benefit ratio was high in camel system as compared to bullock system. It is evident that due to higher cost : benefit ratio and shorter pay back period, the farming use of camel system is advantageous and profitable over the bullock system for small and medium category farmers in the hot arid Thar region.

FARMING system is the result of present day awareness regarding the concept of agriculture which means an optimum exploitation of plant-animal-human relationship. The awareness has brought in the importance of draught animals for achieving total agricultural income, particularly in the north-western Thar desert, where animal power is an inseparable part of

agriculture. In India various farming operation are carried out by manual, mechanical and animal power sources, with later contributing about one-third. Eighty-four million draught animals are used for crop production and transportation purposes. Tractors have assumed some importance in few areas but much of the terrain of farming precludes this type of power application in the interior villages of Thar desert. The present degree of mechanized farming in hot arid region is selective and quite low.

This situation prevents to use any labour-saving equipment (like tractors etc). Moreover, increased cost of fuel, non-availability of spare parts in the interior village conditions, high maintenance and upkeep of tractor engines by the farmers are some burning problems which compelled the farmer to replace the mechanical device with animal power like camel/ bullock. The animal should be compatible with crop cultivation instead of competing with it for land and water resources.

¹Scientist and Incharge, Camel Management Unit, ²Senior Research Fellow

Camel used in farming provides more income and employment to the youth

Bullock used in farming taken over by camel in hot arid Thar region

Camel rearing enterprise fits well with such requirements. Camel energy is not only cost-effective but also profitable and remunerative. The total world camel population is estimated to be 19.32 million of which India has 1.03 million. Since 85% of the gross cultivated area of the Bikaner district is non-irrigated camel carts hold a significant potential for financing. In Rajasthan major population of draught animals are bullocks, followed by camels. In comparison to other livestock species camel remained neglected until this century when it drew attention because of its unique adoptive characteristic for survivability in the harsh conditions of the desert ecosystem. Camel can tolerate high temperature, solar radiation and water deprivation and subsists on poor quality thorny vegetation. It is, therefore, necessary to investigate the main characteristic features and economics of farming use of camel system as well as bullock system in order to know whether or not these animals are efficiently utilized by farmers and also to find out economic viability of both type of farming systems.

The required data were collected in the suitably developed and pre-tested proforma by survey method. A meticulous and comparative observations were recorded on farming use of camel system (single camel with necessary

implements) and bullock system (a pair of bullock with necessary implements). The selection of respondent was carried out by using stratified random sampling technique. The study involved a total of four zones of Khajuwala tehsils (Bikaner district) of Thar desert. Each of the four zones (north, south, east and west) consisted

of 20 villages. A sample of 16-17 households was drawn from each village randomly for data collection. A total sample of 180 camel keepers and 164 bullock farmers were interviewed. A detail economics of both type of farming system were analyzed by using the linear programming. To work out the estimates of maintenance cost of

Table 1. Economic gains from agricultural land by using camel and bullock

Crop	Average production (q/ha)	Average cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	Returns/ rupee investment (Rs)	Camel (C) Bullock (B) system
Cotton	16.60	5 780	21 580	15 800	3.73	B-mostly C-rarely
Groundnut	31.40	9 340	45 530	36 190	4.87	C-mostly B-rarely
Moth	5.60	2 240	7 000	4 760	3.13	C/B
Guar	8.00	2 256	10 400	8 144	4.60	C/B
Wheat	23.60	5 460	15 340	9 880	2.81	C/B
Mustard	12.40	2 348	14 880	12 532	6.34	C/B
Gram	10.00	3 332	17 000	13 668	5.10	C/B

Table 2. Influence of category of farmers on livestock management practices

Category of farmers	Camel (%)				Bullock (%)		
	Intensive	Semi-intensive	Extensive	Overall	Intensive	Semi-intensive	Overall
Small ≤ 6 ha	45.60	33.90	20.50	15.00	57.90	42.10	23.17
Medium 7 to 15 ha	56.80	23.40	19.80	61.67	62.90	37.10	55.49
Large ≥ 16 ha	60.50	21.50	18.00	23.33	79.10	20.90	21.34
Overall	55.56	24.44	20.00		65.24	34.76	
Chi-square value			1.91**			4.43**	

**Significant at 1% level.

draught animals (feeding and health cover etc.), necessary implements and cost of crop cultivation the opportunity cost of owned inputs and actual prices paid by the farmers for purchasing inputs were considered. To obtain the gross returns from different sources of income of farmers, market prices and present day value were considered.

Crop husbandry and draught animals go side by side in boosting the farming business into a profitable enterprise. In these desert area socio-economic status of animal keepers are very poor. The land is mostly 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. The average time required for ploughing of each acre of land was almost the same in camel (1.12 ± 0.32 day) and bullock (1.23 ± 0.37 day) systems, but the average effective working life period of camel (18.45 ± 0.89 years) was higher as compared to bullock (14.79 ± 0.65 years) used under farming operations. The average life period of animal-drawn implements was almost equal. Number of family and hired labour employed/ha/day in both system were almost similar. Maximum camel keepers (91.23%) involved themselves in farming operation except few large categories (8.77%) engaged hired labour. Almost a similar trend was found in case of bullock system. The average cost of male camel were Rs 9 782, where as the average cost of bullock was Rs 5 578. The average cost of animal-drawn implements was almost same. Most of the camel keepers purchased their camel on cash (91%) basis, followed by instalment (6%), loan (3%). A similar trend was found in case of bullock farmers. Mostly male camel (90.34%) were used in various farming operations than female (9.56%). A wide range of age of camel and bullock were used under various farming operations. Maximum 6–8 year age group of camel were used

Table 3. Economic analysis of farming use of camel and bullock system

Fixed cost (Rs)	Camel system (N = 180)	Bullock system (N = 164)
Interest on investment (@ 9%)	1 010	1 192
Depreciation of implements [junk value @ 10%]	157	168
Depreciation of animal [salvage value @ 12 %]	438	663
Insurance on animal	483	582
Total fixed cost	2 088	2 605
Variable cost/year (Rs)		
Hired labour	11 310	12 246
Family labour	11 232	14 560
Maintenance of animal	14 600	29 200
Repair and maintenance of animal-drawn implements	100	100
Miscellaneous other expenditures	200	200
Total variable cost	37 442	56 306
Economic estimate		
Total expenditure (Rs)	39 530	58 911
Earning from different sources		
Net income from agriculture/year (Rs/ha)	25 021	20 810
Sale of manure (@ Rs 75/Q)	821	1 600
Income from carting (Rs)	42 300	39 950
Profit (Rs)	28 612	3 449
Pay-back period for investment on animal system (year)	0.39	3.84
Cost : benefit ratio	1.72	1.05

under various farming operations, followed by 8–10 years, 4–6 years, >10 years and < 4 years age group with overall average of 6.43 ± 0.98 years. On the other hand, maximum 4–6 years age group of bullocks were used for the same purpose, followed by 6–8 years, 8–10 years, < 4 years and > 10 years age group with overall average of 4.12 ± 0.76 years. The average working days in a year (in agriculture operation and carting) was almost equal in both type of farming systems. The mean working time (hr/day) for *rabi* and *kharif* season was about same in both cases. Annual average net income (Rs/ha) from *kharif* crop was more in camel system as compared to bullock system because mostly camel are used for cultivation of groundnut, a *kharif* crop which was providing comparatively higher returns per rupee investment than other *kharif* crop where bullock were mostly used.

Economic gains from agricultural land by using camel and bullock is presented in Table 1. Among the *kharif* crops groundnut provided higher

returns per rupee investment, followed by guar, cotton and moth whereas among the *rabi* crop mustard provided higher returns per rupee investment, followed by gram and wheat. For cultivation of groundnut, camel was mostly used whereas for cultivation of cotton, bullock was mainly used because groundnut requires sandy type soil and cotton requires sandy-loam type soil. For cultivation of all other crops camels and bullocks both were used as per the availability.

Influence of category of farmers on livestock management practices is given in Table 2. Villages of north-western Rajasthan are characterized by scattered households which are clustered into small individual called hamlet (*dhanis*). These hamlets are situated along with their agricultural land. The efforts of farmer made towards augmentation of its production by using draught animal with minimum maintenance cost. Maximum extensive system was practised by small category of camel keepers. However, this system was

not prevailing in case of bullock management. In both cases maximum intensive system was practised by large category, whereas maximum semi-intensive system was practised by small and medium categories. Overall intensive system of management of camel and bullock was more, followed by semi-intensive and extensive system, mainly due to shrinkage of grazing land. The chi-square test showed a significant ($P < 0.01$) influence of categories of farmers on management practices of camel and bullock.

Economic analysis of farming use of camel and bullock system is presented in Table 3. The bullock system (Rs 1192) required higher interest on investment than camel system (Rs 1010). The depreciation of all necessary implements used under camel and bullock system was almost same when the junk value (JV) of implements was considered @ 10% of average initial cost. The depreciation of a pair of bullock (Rs 663) was more than a single camel (Rs 438) when the salvage value (SV) was considered @ 12%. The expenditure for insurance on bullock system (Rs 582) was more than camel system (Rs 483) when premium rate was considered @ 5% of average initial cost along with

overall service tax @ 5% etc. The overall total fixed cost was high in bullock system (Rs 2605) than camel system (Rs 2088). The various components and sub-components of variable cost were considered on yearly basis. The expenditure for hired labour as well as family labour were almost the same in both type of farming systems. Maintenance cost of a pair of bullock (Rs 29200) was quite high as compared to camel system (Rs 14600). The average contribution for expenditures towards repair and maintenance of animal-drawn implements and miscellaneous/other expenditure are almost equal in both type of farming systems. The overall total variable cost was quite high in bullock system (Rs 5630) as compared to camel system (Rs 37442).

Analysis of economic estimate revealed that the total expenditure was found to be higher in bullock system (Rs 58911) as compared to camel system (Rs 39530) because a pair of bullock was involved in farming operations whereas in camel system a single animal is involved for the same purpose. The average earning from sale of manure was more in bullock system (Rs 1600) because more manure was available from two bullock at a time. The average income

from camel carting was high as compared to bullock carting. The farming use of camel system provided a high profit than bullock system in hot-arid ecosystem. The pay-back period (PBP) for investment on animal system was quite less in case of camel (0.39 year) than bullock (3.84 years). On the contrary the cost : benefit ratio was high in camel system (1.72) as compared to bullock system (1.05).

SUMMARY

Camel are life-line of the rural population in the remote villages of Thar desert. It also provides more income and employment to the youth of farmer's family. The animal wealth of the farmers can be utilized efficiently and preserved as a fixed asset, which is a symbol of dignity, social prestige and pride to the farming community. This study creates awareness among the otherwise ignorant farmers regarding the benefits of farming use of camel over the bullock system. Due to higher cost : benefit ratio and shorter pay-back period, the farming use of camel system is beneficial and profitable over the bullock system for small and medium category farmers in the hot arid Thar region.

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