STUDIES ON FARMING USE OF CAMEL AND BULLOCK SYSTEM^o IN HOT ARID VILLAGES OF THAR DESERT

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ABSTRACT

A survey was carried out on the farming use of camel Vs. bullock system covering four zones of Thar desert. A detail economics of both type of farming systems were analysed 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. Overall in the study area maximum camel were reared under intensive system followed by semi - intensive and extensive system. Among the *kharif* season crops, groundnut provided higher return per rupee investment, followed by guar, cotton and moth whereas among the *rabi* season crops, mustard provided higher return per rupee investment, followed by gram and wheat. The farming use of bullock system required higher expenditure in terms of interest on investment, depreciation and expenses towards insurance of animals. Similar trend was observed in overall total fixed cost, overall total variable cost and maintenance cost of animal. 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 high 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 farmers in the hot arid Thar region.

INTRODUCTION

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 sector and livestock add to the importance of maintaining draught animals. In India, various farming operations are carried out by manual, animal and mechanical power sources, animal power contributing about one third (Mishra, 1986). Eighty-four million draught animals are used for crop production and transportation purposes (Cartman, 1994). Tractors have assumed some importance in few areas but much of the terrain of farming and the poverty of the population preclude this type of power application in the inferior villages of Thar desert. The present degree of mechanised 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 time in the interior village conditions, difficult maintenance and upkeep of tractor engines by the farmers are some burning problems which compel the farmer not to replace the animal power like camel/bullock with the mechanical device. Singh (1999) reported that animals continue to be a major source of motive power (tractive and rotary) in India and are being used by the small farmers. The animal should be compatible with crop cultivation instead of competing with it for land and water resources. Camel rearing enterprise fits well with such requirements. 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). In the state of Rajasthan, major population of draught animals are bullocks followed by camels. The camel, "Ship of the desert," uses various adaptive mechanism rather than bullock for survival in the desert.

It has been estimated that a well fed camel could store some six months energy on it's back while cattle are unlikely to have more than two-three months, if run out of feed (Khanna, 1986). Camel can tolerate high temperature, solar radiation and water deprivation and subsists on poor quality thorny vegetation. Camel energy is not only cost effective but also profitable and remunerable. It is, therefore, necessary to investigate the main characteristics features and economics of farming using camel system Vs. bullock system in order to know whether these animals are efficiently utilised by farmers and to find the economic viability of both types of farming systems.

MATERIAL AND METHODS

Data collection: A study has been carried out on the farming use of camel system and bullock system at grass root level of Thar desert. The required data were collected in the suitably developed and pretested proforma by survey method during the year 2001-02. It covered various aspects of farming use of camel and bullock systems, viz., social status of different categories of animals keepers, necessary implements required for agricultural operations, crop husbandry practices, aspects on draught animal rearing, feeding, earning and the profit of animal keepers, comparative management practices of camel and bullock, days of operation in a year etc. 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).

Sampling Technique: The selection of respondent was carried out by using stratified random sampling technique. The study involved four zones of Khajuwala tehsils (Bikaner district) of Thar desert. Each of the four zones (North, South, East and West) consisted of twenty villages. A sample of 16 to 17 households were drawn from each village randomly for data collection. A total sample of 180 camel

keepers and 164 bullock farmers were interviewed.

Economic analysis: A detail economics of both type of farming system was analysed by using the Linear programming method (Loomba, 1992) and under this method all possible, feasible linear components sub-components were considered to reach a final conclusion. To work out the estimates of maintenance cost of draught animals (feeding and health cover), 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, the market prices and present day value were considered.

RESULTS AND DISCUSSION

The mean values of characteristic features of farming using camel and bullock system is presented in Table 1. The average days required for ploughing of each acre of land was almost same in camel and bullock systems. 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. Similar trend was found by Jain *et al.* (2000). On an average a equal number of family and hired labour employed/ha/day in both type of farming systems. Maximum camel keepers (91.23%) involved themselves in farming operation except few large category (8.77%) engaged some hired labour. Almost a similar trend was found in case of bullock system. The average cost of male and female camel were Rs. 9782 $\pm$ 14/- and Rs. 8619 $\pm$ 11/- respectively where as the average cost of bullock was Rs. 5578 $\pm$ 10/-. The average cost of animal drawn implements were almost same. Fig. 1 reveals means of purchasing of animal and implements. Most of the camel keepers purchased their camel on cash (91 %)

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Table 1. Mean $\pm$ SE of characteristic features of farming use of camel and bullock system

Parameter	Camel system (n = 180)	Bullock system (n = 164)
Ploughing of each Ac of land (Days)	1.12 $\pm$ 0.32	1.23 $\pm$ 0.37
Life period of animal (Year)	18.45 $\pm$ 0.89	14.79 $\pm$ 0.65
Life period of animal drawn Implements (Year)	11.56 $\pm$ 0.53	11.22 $\pm$ 0.51
Family labour employed/ha/day	2.16 $\pm$ 0.47	2.80 $\pm$ 0.48
Hired labour employed/ha/day	1.45 $\pm$ 0.31	1.57 $\pm$ 0.34
Cost of animal (Rs.)		
Male -	9782 $\pm$ 14	5578 $\pm$ 10
Female -	8619 $\pm$ 11	NA
Age of animal used under farming system (Year)	6.43 $\pm$ 0.98	4.12 $\pm$ 0.76
Cost of animal drawn implements (Rs.)	2014 $\pm$ 65	2089 $\pm$ 63
Working days /year		
Agriculture Operation -	130.11 $\pm$ 2.10	130.00 $\pm$ 2.24
Working time of animal in farming operation (Hrs/day)		
Rabi -	10.43 $\pm$ 0.32	10.52 $\pm$ 0.37
Kharif -	9.76 $\pm$ 0.29	9.87 $\pm$ 0.28
Net income from agriculture per year (Rs./ha)		
Kharif -	14821 $\pm$ 35	10590 $\pm$ 28
Rabi -	10200 $\pm$ 27	10220 $\pm$ 27

Fig. 1. Means of purchasing of animal and implements

basis followed by installment (6%), loan (3%). used in various farming operations than female. A similar trend was found in case of bullock (9.56%). A wide range of age of camel and farmers. Mostly male camel (90.34%) were bullock were used under various farming

Fig. 2. Various age group of animal used in farming system

operations. Fig. 2 represents various age group of animal used in farming system. Maximum 6 - 8 year age group of camel was used under various farming operations, followed by 8 - 10 years, 4 - 6 years, >10 years and < 4 years age group. 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. The consistency of present observations with earlier reports (Bhakat and Sahani, 2000) has been given. Dave (1999) also reported that most of the draught animals employed by the farmers were between 5 to 10 years of age. 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 (hrs/day) for *rabi* and *kharif* season was about same in both cases. Annual average net income (Rs./ha) from *kharif* season crop was more in camel system as compared

to bullock system.

Influence of category of farmers on livestock management practices is given in Table 2. Villages of north - western Rajasthan are characterised 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 his production by using draught animal with minimum maintenance cost. In both cases of camel and bullock management maximum intensive system was practiced by large category farmers and maximum semi-intensive system was practiced by small and medium categories. Overall most of the camel and bullock were reared under intensive system of management. It was followed by semi-intensive and extensive system. As compared to other category, small category of camel keepers reared their camel in extensive system (20.50%) of management.

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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
Over all	55.56	24.44	20.00		65.24	34.76	
Chi square value		1.91**			4.43**		

** Significant at 1% level.

Table 3. Economic gain from agricultural land by using camel and bullock.

Crop	Season K - Kharif R - Rabi	Average production (q/ha)	Average cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	Return per rupee investment (Rs.)	By using Camel (C) Bullock (B)
Cotton	K	16.60	5780	21580	15800	3.73	B-mostly C- rarely
Ground Nut	K	31.40	9340	45530	36190	4.87	C-mostly B- rarely
Moth	K	5.60	2240	7000	4760	3.13	both
Guar	K	8.00	2256	10400	8144	4.60	both
Wheat	R	23.60	5460	15340	9880	2.81	both
Mustard	R	12.40	2348	14880	12532	6.34	both
Gram	R	10.00	3332	17000	13668	5.10	both

However this system was not prevailed in case of bullock management. The management practices of camel and bullock was significantly ($P < 0.01$) influence by categories of farmers.

Economic return from agricultural land by using camel and bullock is presented in Table 3. Agriculture and draught animal go side by side in boosting farming business into a profitable enterprises. Among the *kharif* season crops, groundnut provided highest return per rupee investment followed by guar, cotton and moth whereas among the *rabi* season crops, Mustard provided highest return per rupee investment followed by gram and wheat. This was due to reason that cultivation of groundnut, camel were mostly used where as for cultivation of cotton, bullock were maximum used because groundnut requires sandy type soil and cotton

requires sandy-loam type soil. For cultivation of all other crops camel and bullock may used at any proportion. Khanna (1986) reported that camels have soft elastic feet with thick skin around which is good for travel in long sandy terrains.

The analysis of fixed and variable costs is presented in Table 4. 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 (J.V.) 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 (S.V.) was considered @ 12%. The expenditure for

Table 4. Analysis of fixed and variable costs

Fixed cost (Rs.)	C.S. (n = 180)	B.S. (n = 164)
Interest on investment (@ 9%)	1010	1192
Depreciation of implements (J.V. @ 10 %)	157	168
Depreciation of animal (S.V. @ 12%)	438	663
Insurance on animal.	483	582
Total F.C.	2088	2605
Variable cost/year (Rs.)		
Hired Labour	11310	12246
Family Labour	11232	14560
Maintenance (mainly feeding) of animal and implements	14900	29500
Total V.C.	37442	56306

Table 5. Analysis of economic estimate

Factors	C.S. (n = 180)	B.S. (n = 164)
Total expenditure (Rs.)	39530	58911
Earning from different sources		
Net income from		
(1) Agriculture per year (Rs./ha)	25021	20810
(2) Sale of manure (@ Rs. 75/q)	821	1600
(3) Income from carting (Rs.)	42300	39950
Total income (Rs.)	68142	62360
P.B.P. for investment on animal system	5 months	3 years 10 months
Cost benefit ratio	1.72	1.06

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%, the overall total fixed cost was higher 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 on hired and family labour was more in bullock system as compared to camel system. Maintenance cost of a pair of bullock (Rs. 29200/-) was quite high as compared to camel system (Rs. 14600/-). The average expenditures toward repairs and maintenance of animal drawn implements and miscellaneous/other expenditure almost equal in both type of farming systems. The overall total variable cost was quite high in bullock system (Rs. 56,306/-) as compared to camel system (Rs. 37,442/-).

The analysis of economic estimate is presented in Table 5. The data indicates that total expenditure was higher in bullock system (Rs. 58911/-) than camel system (Rs. 39530/-) because a pair of bullock was involved in farming operations where as in camel system a single animal involved for the same purpose. The average earning from selling of manure was more in bullock system (Rs. 1600/-) because more manure was available from two bullocks 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 (5 months) than bullock (3 years 10 months). Further, the cost benefit ratio was high in camel system (1.72) as compared to bullock system (1.06).

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CONCLUSION

The animal wealth of the farmers can be utilised efficiently and preserved as a fixed asset, which is a symbol of dignity, social prestige and pride to the farming community. To ensure a regular income and sufficient food for farmers and better living standards it is necessary to go for some other alternate which will provide more income and employment to the unemployment youth of farmer's family. The great advantage of this study is to create awareness among the otherwise ignorant farmers regarding the advantages of farming use of camel over the bullock system. Camel

are life line of the rural population in the remote villages of Thar desert. It holds practical values for cost effectiveness, sustainable, environmentally friendly and socio - culturally acceptable. The idea of sustainability of agriculture and draught animal production revolves around better utilisation of time, money, resources and family labours of the farmers. Therefore, study concludes that 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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