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An Economic Analysis of Different Farming Systems Prevailing in Nagaur District of Rajasthan

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A B S T R A C T

The present study carried out on an economic analysis of different farming systems prevailing in Nagaur district of Rajasthan. The main aimed to work out the economics associated with income and employment generated through different farming systems. Four farming systems were existed in both rainfed and irrigated situations of Nagaur district viz: FS-I: Crop + Dairy (C+D), FS-II: Crop + Dairy + Goat (C+D+G), FS-III: Crop + Dairy + Goat + Sheep (C+D+G+S) and FS-IV Crop + Poultry (C+P). Two tehsils namely; Merta city and Riyan Badi were selected for the study purpose. The total cost per households, was the lowest under FS-II and it was the highest under FS-IV in both the rainfed and irrigated situation. Under rainfed situation, FS-III (Crop + Dairy + Goat + Sheep) was the most profitable farming system on net return basis (Rs. 236889.92) and return per rupee investment i.e., Rs. 1.74. While on the basis of net return per household, the most profitable farming system adopted under the irrigated situation was FS-IV (Crop + Poultry) with Rs. 400540.71 per farm while on the basis of returns per rupee investment; it was FS-I (Crop + Dairy) i.e., Rs. 1.45. On per household basis employment generation under rainfed situation was minimum under FS-I (325 man days) and it was maximum under FS-IV (533 man days). In irrigated situation the lowest employment was generated under FS-I (350 man day) and it was the highest under FS-IV (570 man day). The employment generations were more under irrigated situation as compared with the rainfed situation because under irrigated situation, such as cotton, cumin and wheat crops required more labours.

***Key words*:** Crop, Dairy, Farming system, Goat, Poultry

Agriculture plays a very important role in the Indian economy and the declining trend in size of land holding poses a serious challenge to the sustainability of farming. The crop and cropping system-based perception of research needs to compose new technique used for farming systems-based research conducted in a holistic approach for the sound management of existing resources by farmers [1]. A judicious mix of cropping system with allied enterprises like dairy, poultry, piggery, fishery, sericulture, etc. suited to the given agro climatic conditions and socio-economic status of farmers would bring prosperity to the farmers. Costs and returns play an important role in portraying economic viability of different enterprises. Generally, a producer farmer can increase his income in two ways either by increasing the production or by reducing the cost of production [2]. Therefore, an attempt is made in present study to estimate cost and returns from different farming systems prevailing in the study area and the income generated through them. Rajasthan is the largest desert state and agriculture in most part of the state is rainfed and is prone to high production threat. In order to meet the farm and family requirement, the farmers in the state have evolved different combination of crop, livestock, horticulture, poultry etc. Food security always remains an uncompromising goal of farm level agriculture for rural masses in most of the part of the state. The total geographical area of Nagaur district is 1764 thousand hectares. Out of which, 19.3 per cent is irrigated area and 80.7 per cent is rainfed area. The goal of research study is to develop sustainable land use systems which will optimize the farm resource use, minimize degradation with consideration to regenerative capacity and increase income and employment for farm families and promote quality of life and environment [3]. Farming system aims in utilizing the available resources efficiently and offers a better scope for sustainable production.

The Indian economy is predominantly rural and agrarian, and the declining trend in size of land holding poses a serious challenge to the sustainability and profitability of farming. In view of the decline in per capita availability of land from 0.5 ha in 1950-51 to 0.15 ha by the turn of the century and a projected further decline to less

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than 0.1 ha by 2020, it is imperative to develop strategies and agricultural technologies that enable adequate employment and income generation, especially for small and marginal farmers who constitute more than 80% of the farming community. The crop and cropping system-based perspective of research needs to make way for farming systems-based research conducted in a holistic manner for the sound management of available resources by small farmers [4]. It also ensures the farmers against the risk and uncertainties in agriculture. For the mission, doubling of farmers income by 2022, this study will be helpful in achieving target by improvement in productivity resources use efficiency or saving in cost of production, increasing in cropping intensity, improvement in terms of trade for farmers or real prices received by farmers. In view of this, an attempt was made to study employment pattern of family members in study area through farming systems activities adopted by them. Keeping in view all the above points, the present study entitled "An economic analysis of different farming systems prevailing in Nagaur district of Rajasthan".

MATERIALS AND METHODS

The present study was conducted in Nagaur district of Rajasthan. Nagaur district was selected purposively as it has one of the major mixed farming areas which is where both irrigated and rainfed farming systems with the highest livestock population prevail. There were four villages Shivarampura and Jajarawas from Merta city tehsil and Thanwala and Dhanipura from Riyan Badi tehsil, were selected for the study. Sixty farmers (thirty each from rainfed and irrigated farming situations) were randomly selected in proportion to their total number in each size groups. Both primary and secondary data were collected for the study. The objectives of the study were achieved by the using various statistical and mathematical tools. The secondary data were collected from various Publications and Government offices. Primary data on various aspects of farming were collected from head of each household with the help of a set of pre-tested comprehensive questionnaire designed for the study. The operational cost in terms of labour and outputs (main and by- products. The various items of fixed cost were land revenue, land rent and depreciation. The return from crop, livestock, goat and vegetables were estimated by multiplying the output with the actual price realized to quantity sold by them. Employment generated in farming systems was calculated by taking time spent in performing various operations by standardizing male, female and child labour.

RESULTS AND DISCUSSION

Existing farming systems

In the study area, the four farming systems viz; FS-I (C+D), FS-II (C+D+G), FS-III (C+D+G+S) and FS-IV (C+P) were identified under both rainfed situation and irrigated situation on sample farms. In case of rainfed situation, FS-I, FS-II, FS-III and FS-IV farming systems were adopted by 73.33, 10.00, 13.33, and 3.34 per cent farmers, respectively whereas under irrigated situation, farming systems adopted by farmers was found 70.00, 13.33, 13.33 and 3.34 per cent under FS-I, FS-II, FS-III and FS-IV, respectively. It was observed that in both situations, FS-I (C+D) was adopted by majority of farmers whereas minority of farmers adopted FS-IV (C+P).

The crops grown in all the farming systems were almost same under both the situations except for some crops i.e. cumin or wheat in FS-II and FS-IV under the irrigated situation. Where both situations, the enterprises followed in FS-I were crops and dairy and the components of FS-II were crops, dairy and goat rearing. In case of FS-III, enterprises such as crops, dairy, goat and sheep rearing. Regarding FS-IV, it was observed that the enterprises followed under this system were crops and poultry.

Table 1 Comparison of costs and returns generated through different farming systems under rainfed and irrigated situations

Particulars	Rainfed situation				Irrigated situation			
	FS-I	FS-II	FS-III	FS-IV	FS-I	FS-II	FS-III	FS-IV
TVC	146776.53 (67.78)	46508.72 (58.24)	348416.05 (76.00)	365085.34 (79.18)	173706.84 (72.13)	135947.77 (74.04)	381605.85 (78.53)	952847.22 (78.29)
TFC	69750.47 (32.22)	33343.43 (41.76)	108408.27 (24.00)	96018.01 (20.82)	67128.54 (27.87)	47662.26 (25.96)	104313.76 (21.47)	264225.23 (21.71)
TC	216527.01 (100)	79852.16 (100)	449141.58 (100)	461103.35 (100)	240835.38 (100)	183610.03 (100)	485919.61 (100)	1217072.42 (100)
GR	312705.49	122605.55	779931.5	577816.7	349600.99	245955	637204.42	1617613.1
NR	94545.88	42753.39	236889.92	116713.34	108267.15	62344.93	151284.78	400540.71
Return per rupee	1.44	1.53	1.74	1.25	1.45	1.34	1.31	1.32

Cost and return generated through different farming systems

Costs and returns under different farming systems adopted by the households under rainfed and irrigated situation of the Nagaur district were computed. The total cost under rainfed farming system was the lowest under FS-II and the highest under FS-III. It varied from (Rs. 79852.16) under FS-II to (Rs. 4491410.85) under FS-III. The net return among the four farming systems varied from (Rs. 42753.39) under FS-II to (Rs. 236889.92) under FS-III. The returns per rupee investment under rainfed situation of Nagaur district was varied from Rs. 1.25 under FS-IV to Rs. 1.74 under FS-III. In selected farming systems the taken as a whole returns per rupee invested was more than one showed that all the systems were beneficial for the district. The comparison of costs and returns of different farming systems adopted under irrigated situation was presented in (Table 1). Data shows that the total cost under irrigated farming system was the lowest under FS-II (Rs. 183610.03) and the highest under FS-IV (Rs. 1217072.42). Total variable cost as percentage of total cost varied from 72.13 per cent under FS-I to 78.53 per cent under FS-III. The net returns varied from (Rs. 62344.93) under FS-II to (Rs. 400540.71) under FS-IV. Returns per rupee investment varied from Rs. 1.31 under FS-III to Rs. 1.45 under FS-I under irrigated situation. The reason for getting higher net returns under FS-IV and returns per rupee investment under FS-I was due to growing of cash crop i.e., cotton, cumin under this system was more as compared to other systems of irrigated situation. Thus, it

was concluded that on the returns per rupee investment basis the FS-I was more profitable than other farming systems in the district. All the systems under irrigated situation gave more than 1.31 on per rupee invested. It can be concluded from the above studies that by optimizing the existing farming systems of different categories of farmers a regular flow of returns throughout the year and additional employment generation would be possible by integrating crop along with different livestock enterprise, poultry, sugarcane based, vegetable based, goat and sheep rearing were more profitable, attaining maximum net returns, highly employment generation, improving soil fertility and efficient utilization of available farm resources and increase the income per unit of land [5-7].

Table 2 Income and employment generated under different farming systems in rainfed situation (per annum)

S. No.		Particulars	FS-I	FS-II	FS-III	FS-IV	Overall
Income	A	Net income / household (Rs.)	94545.85	42753.39	236889.92	116713.34	122725.63
	B	Net income/ ha. (Rs.)	97469.98	36231.69	430708.94	14644.08	144763.67
	C	Land holding size (ha)	0.97	1.18	0.55	7.97	2.67
Employment	A	Employment / household (man-days)	325	352	497	533	426.75
	B	Employment / ha (man-days)	335.05	298.30	903.64	66.87	400.96

Income and employment generation under rainfed situation

The employment generated on the farm varied with type of farming systems followed in the study area. It can be analyzed from (Table 2) that out of four farming systems under rainfed situation of Nagaur district, maximum net income per farm per annum generated from FS-III was (Rs. 236889.92) followed by FS-IV (Rs. 116713.34), FS-I (Rs. 94545.88) and FS-II (Rs. 42753.39). Under FS-II minimum net income was due to more expenses incurred on total fixed cost in dairy and goat enterprises. Net income per hectare was maximum under FS-III (Rs. 430708.94) due to sheep enterprises gave more benefit followed by FS-I (Rs. 97469.98), FS-II (Rs. 36231.69) and it was minimum under FS-IV (Rs.14644.08). Crop + poultry+ fish + goat gives the highest net income (Rs. 1,59,485/year) and employment generation (752 man-days/year) as reported by [8]. The per farm employment generation was maximum under FS-IV (533 man-days) followed by FS-III (497 man-days), FS-II (352) and minimum under FS-I (325 man-days) due to dairy and crop activities are adopted by households. While employment generation per hectare was maximum under FS-III (903.64 man-days) followed by FS-I (335.05 man-days), FS-II (298.30 man-days) and it was minimum under FS-IV (66.87 man-days). FS-III generated the highest employment per hectare due to dairy, goat and sheep activities. Thus, it was concluded that maximum net income generated per farm and net income per hectare were the highest under FS-III. The highest per farm and per hectare employment were recorded under FS-III. The overall net income and employment generated per household were Rs. 144763.67 and 426.75 man days under rainfed situation respectively [9-10].

Table 3 Income and employment generated under different farming systems under irrigated situation (per annum)

S. No.		Particulars	FS-I	FS-II	FS-III	FS-IV	Overall
Income	A	Net income/households (Rs.)	108267.15	62344.93	151284.78	400540.71	180609.39
	B	Net income/ha. (Rs.)	109360.75	30264.53	458438.72	41207.89	159817.97
	C	Land holding size (ha)	0.99	2.06	0.33	9.72	4.33
Employment	A	Employment/household (in man-days)	350	370	485	570	443.75
	B	Employment/ha (in man-days)	353.53	179.61	1469.70	58.64	515.37

Income and employment generated under irrigated situation

The income and employment generated under irrigated situation was presented in (Table 3). Net income per farm per annum was the highest under FS-IV i.e., Rs. 400540.71 and it was the lowest under FS-II i.e., Rs. 62344.93 while net income per hectare varied from Rs. 458438.72 under FS-III to Rs. 30264.53 under FS-II. Maximum employment per farm was generated under FS-IV (570 man-days) followed FS-III (485 man-days), FS-II (370 man-days) and it was minimum under FS-I (350 man-days). On per hectare basis the maximum employment generated under FS-III (1469.70 man-days) followed by FS-I (353.53 man-days), FS-II (179.61 man-days) and it was minimum under FS-IV (58.64 man-days). Under FS-III which includes dairy, goat, sheep and crop activities, there was more utilization of family labour which resulted to the highest employment. Thus, it was concluded that per farm the maximum net income generated under FS-IV whereas on the per hectare maximum net income was found under FS-III. While the employment generation on per farm was maximum under FS-IV and per hectare it was found under FS-III. The overall net income and employment generated was Rs. 159817.97 and 515.37 man-days under irrigated situation of Nagaur district. Integration of various sizes of land holdings tends to be more profitable than arable farming alone, different combination of components like crops, vegetables fishery, poultry and goat rearing and in irrigation condition more employment generation than rainfed condition [11-14].

Policy implications and suggestions

Based on the conclusions drawn from the results of the study, following policy and suggestions may be suggested:

- The study concluded that under rainfed area, FS-III (C + D + G + S) and under irrigated situation, FS-IV (Crop + Poultry) gave better results in terms of net returns and employment generation per households under study area. Thus, farmers should be motivated to adopt non-crop activities like dairy, goat rearing, sheep rearing and poultry for enhancing their income and employment on farms.
- Efforts should also be made at all levels viz; at Government level, Agriculture Department, Co-Operative Societies, NGO's and other various social groups to create a

social awareness among the people for adoption of cultivation of commercial/cash crops like cumin, cotton etc.

- In the study area, under irrigated situation, for efficient use of available irrigation facilities, State Government and other financial agencies should increase the number of farmers being benefited by subsidy provided to micro-irrigation systems and for rainfed situation, awareness should be created among farmers for construction of more and more farm ponds for conservation of rain water by the State Government and other agencies.
- Government along with private agencies should organize efforts for breed improvement programmes and also should develop marketing/collection center of milk and milk product, medical facilities and buffer stock for feed and fodder to avoid adverse farming conditions at village levels as well as block levels.

CONCLUSION

Under both rainfed and irrigated situations, FS-I (Crop + Dairy) was adopted by maximum number of farmers and minimum number of farmers adopted FS-IV (Crop + Poultry). Under rainfed situation, the total cost per household under FS-IV (C + P) was the highest (i.e., Rs. 461103.35) and it was the lowest (i.e., Rs. 79852.16.) under FS-II (C + D + G) and total gross returns per household under FS-III (C+D+G+S) were the highest (i.e., Rs. 779931.5) and it were the lowest (i.e., Rs. 122605.55) under FS-II (C + D + G). Under irrigated situation, the total cost per household under FS-IV (C + P) was the highest (i.e., Rs. 1217072.42) and it was the lowest (i.e., Rs. 183610.0) under FS-II (C + D + G) and the total gross returns per household under FS-IV (C + P) were the highest (i.e., Rs. 1617613.1) and it were the lowest (i.e., Rs. 245955) under FS-II (C + D + G). The net income per household under FS-III (C + D + G + S) was found maximum (i.e., Rs. 236889.92) and it was minimum (i.e., Rs. 42753.39) under FS-II (C + D + G) under rainfed situation while under irrigated situation, net income per household was found maximum (i.e., Rs. 400540.71) under FS-IV (C + P) and minimum (i.e., Rs. 62344.93) under FS-II (C + D + G). Under rainfed situation, return per rupee investment was found maximum (i.e., Rs. 1.74.) under FS-III (C + D + G + S) and minimum (i.e., Rs. 1.25) under FS-IV (C + P). Under irrigated situation, return per rupee investment was found maximum (i.e., Rs. 1.45.) under FS-I (C + D) and minimum (i.e., Rs. 1.31) under FS-III (C + D + G + S). Under rainfed situation, the employment per household was the highest (i.e., 533 man-days) under FS-IV (C+P) and the lowest (i.e., 325 man-days) under FS-I (C + D). Whereas the employment per hectare was the highest (i.e., 903.64 man- days) under FS-III (C + D + G + S) and the lowest (i.e., 66.87 man-days) under FS – IV (C + P). Under irrigated situation, the employment per household was the highest (i.e., 570 man- days) under FS-IV (C + P) and the lowest (i.e., 325 man-days) under FS-I (C + D). Whereas the employment per hectare was the highest (i.e., 1469.70 man- days) under FS-III (C + D + G + S) and the lowest (i.e., 58.64 man-days) under FS–IV (C+P).

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