

Income and Employment Generation under Existing Farming Systems in Chittorgarh District of Southern Rajasthan

Hari Singh*, S.S. Burark and G.L Meena

Department of Agricultural Economics, MPUAT-Udaipur, Rajasthan, India

*Corresponding author: singhhari71@gmail.com

ABSTRACT

Farming system approach introduces a change in farming techniques for higher production from the farm as a whole with the integration of all the enterprises like dairy, poultry, piggy, fishery, sericulture etc. suited to the given agro-climatic condition and socio-economic status of farmer would bring prosperity to the farmer. Rajasthan, the largest state of Indian union occupies nearly 10.4 per cent geographical area of the country. The present investigation was under taken to work out income and employment generation under existing farming systems in Chittorgarh district of Southern Rajasthan during 2012-13. A total sample of 60 household consisting of 30 under rainfed and 30 under irrigated situation was selected for the study. Four farming systems were existed in both the rainfed and irrigated areas of Chittorgarh district viz. FS-I: Crop+ Vegetables (C+V), FS-II: Crop + Dairy (C+D), FS-III: Crop + Dairy +Goat (C+D+G), FS-IV: Crop +Poultry (C+PO) or Crop + Goat + Orchard (C+G+O).Maximum net income per farm in rainfed area was generated from FS-III (₹ 80146) it was minimum in FS-I (₹ 37515). Net income per hectare was maximum in FS-IV (₹ 138150). Per farm maximum employment generation was observed in FS-II (356.6 man-days) and the minimum in FS-IV (191.50 man-days). On per hectare basis the maximum employment was generated by FS-IV (383.50 man-days) and lowest in FS-I (217.15 man-days). Maximum net income per farm in irrigated area was generated from FS-I (₹ 162690) and it was minimum in FS-II (₹ 106820). The maximum net income per hectare was found in FS-IV (₹ 142165) and it was minimum in FS-II (₹ 89017). Employment generation per farm was maximum in FS-I (693.05 man-days) because of crops and vegetable activities and it was minimum in FS-II (593.05 man-days) while the employment generated per hectare was maximum (666.89 man-days) in FS-IV and it was minimum in FS-II (494.21 man-days). FS-IV generated maximum net income and employment per hectare due to goats and orchard activities

Keywords: Income and employment, cost adjustment, farming system, cost and return

Farming system represents integration of crop, dairy, poultry, Vermicompost, fisheries etc for maximum utilization of limited resources and maximum generation of net income and employment. Farming system approach introduces a change in farming techniques for higher production from the farm as a whole with the integration of all the enterprises like dairy, poultry, piggy, fishery, sericulture etc. suited to the given agro-climatic condition and socio-economic status of farmer would bring prosperity to the farmer. Every farmer tries to choose the farm activities/enterprises depending upon

physical and economic conditions prevailing in his ecosystem. Integration of various farm enterprises ensures growth and stability in overall productivity and profitability. It also ensures optimization of resource use, minimization of risk and generation of employment. Sustainable agriculture or farming is one that contributes to the overall objective of sustainable development i.e. to meet the present needs without compromising the ability of the future generations to meet their own food needs and related demands from the land. Sustainability could be viewed in two facets; one, preservation of

the health of land and water resources and secondly, production of technically feasible and viable crop and livestock enterprises through efficient land and water use, thus conserving environmentally friendly situations in the ecosystem. The land acquired by those small farmers is so meager that it provides very low income and limited family employment. Further, due to continuous and intensive cultivation of land for meeting the objective of food security, natural resources have drastically degraded over time. In this context, there is utmost urgency to develop location specific optimum farming systems, which will be helpful to raise the standard of living of these farm families by ensuring enough employment opportunities. Since farming system differ in different situation such studies conducted on farming system showed that farming system approach is better than conventional farming (Ravishankar, *et al.* 2007 and Singh *et al.* 2007). Farming enterprise includes crop, livestock, poultry, fish, sericulture, vermicompost, dairy, goat, *etc.* A combination of one or more enterprises with cropping, when carefully chosen, planned, and executed, gave greater dividends than single enterprise especially for small and marginal farmers. Farm as a unit is to be considered and planned for effective integration of enterprises to be combined with crop production activity. Judicious mix of one or more of these enterprises with crop should complement the farm income. Farming system represents integration of farm enterprises such as cropping system, animal husbandry, fisheries, forestry, poultry *etc.* for optimal utilization of resources bringing prosperity to the farmer.

Rajasthan, the largest state of Indian union, occupies nearly 10.4 per cent geographical area of the country. Agriculture and allied activities accounted for nearly one fourth of the State Domestic Product against 14 per cent at National Level. Therefore, agriculture despite all odds considered to be the main stay of rural masses in the state. The agriculture in most part of the state is rainfed and is prone to high production risk. In order to meet the farm and family requirement, the farmers in the state have evaluated different combinations of crop, livestock, horticulture, poultry *etc.* Food security always remains an uncompromising goal of farm level agriculture for rural masses in most part

of the state. Accordingly, every region of the state has evaluated crop and livestock species suitable for the region. Out of 10 agro-climatic regions of the state, one region *i.e.* Sub-Humid Southern Plain and Aravalli hills Zone (IVa) falls in Southern Rajasthan and is relatively more diversified for crop and livestock production. In this region crops like maize, *jowar*, cotton, black gram, soybean, groundnut, cluster bean *etc.* are grown in *kharif* season and crops like wheat, rapeseed & mustard, gram, isabgol, *etc.* are grown in *rabi* season. There is substantial area under different vegetables in this region. Among livestock, cattle, buffalo, goat and sheep are the most dominating animals. The farming system models practiced by the farmers include various combinations of field crops, horticulture crops and livestock in southern Rajasthan. The present paper analyze the income and employment in existing farming systems in Chittorgarh district of southern Rajasthan.

MATERIALS AND METHODS

Southern Rajasthan comprises of eight districts viz., Udaipur, Chittorgarh, Bhilwara, Rajsamand, Dungarpur, Banswara, Pratapgarh and Sirohi. These districts fall in agro-climatic region IV A and IV B.

Among these districts Chittorgarh district from IV-A was purposively selected for the study of integrated farming systems, as this district have high potential for development of agriculture and livestock. Multi stage random sampling plan was used. Two tehsils from Chittorgarh district were selected in such a way that one having highest proportion of irrigated area *i.e.* Nimbaheda and other one having highest share of rainfed area *i.e.* Kapasanto total net sown area so that selected tehsils represented irrigated and rainfed farming systems in tribal areas. Fifteen farmers from each village were randomly selected.

Thus, a total sample of 60 households was selected from Chittorgarh district, representing 30 households from rainfed and 30 households from irrigated farming systems. The primary data were collected from selected farmers. The data collected for the year 2012-13 were scrutinized, tabulated and analyzed by using different analytical tools.

Costs and Returns Estimation

The following method for estimation of costs and returns was used:

Gross Cost = Total Variable Cost (TVC) + Total Fixed Cost (TFC)

Gross Return = (Quantity of produce × Prevailing price of produce + Quantity of by- produce × Price of by-produce)

Net return = Gross return – Total cost

Operational or Variable Costs: Operational costs were the actual costs incurred by the farmer along with incidental charges incurred towards labour and material costs. The various items of operational costs were seed, farmyard manure, fertilizers, plant protection chemicals, feeds and concentrates, fodder and straw, labour (hired labour and family human labour) etc. Labour in all enterprises was converted into man-days by multiplying female and child labour by 0.70 and 0.50, respectively. Bullock labour, both owned and hired were accounted at the prevailing hire rates. The operational costs in terms of labour (human, bullock and machine) and other outputs (main and by-products) of one activity utilized as an input in the other activity within the integrated farming system were worked out to assess the cost effectiveness of different integrated farming system.

Fixed Costs: The various items of fixed costs were land revenue, land rent and depreciation. The depreciation rates, life span and junk value for various agricultural implements and machinery were decided in consultation with the respondents. Consequently, the depreciation was calculated using the straight line method as shown below:

$$\text{Depreciation (₹)} = \frac{\text{Purchase Value (₹)} - \text{Junk Value (₹)}}{\text{Life Span (years)}}$$

Interest on fixed capital was calculated at the prevailing bank rate (12%) on the value of the farm and livestock assets.

Returns: The returns from crop, livestock, goat rearing and poultry were estimated by multiplying the actual price realized to quantity sold by them

and the quantities that was retained for seed or consumption was evaluated at the rates prevailing at the time of harvest. The same method was also followed for the valuation of by-products of various enterprises.

Income Generation

Gross income from integrated farming system (GIIFS)

Income generated from Integrated Farming Systems were worked out as follows:

$$\text{GIIFS} = \sum_{i=1}^n Q_i.P_i$$

Where, Q_i is the Physical output (main and by product) of i^{th} component of IFS and

P_i is the price of i^{th} output.

Paid out cost of Integrated Farming Systems (PCIFS)

The PCIFS was work out as:

$$\text{PCIFS} = \sum_{i=1}^n x_i.p_i$$

Where,

x_i = the i^{th} external input in quantity term

p_i = the price of i^{th} external input

Net Income from Integrated Farming System (NIIFS) was worked out as:

$$\text{NIIFS} = \text{GIIFS} - \text{PCIFS}$$

Cost of Internally Adjusted Input (CIAI)

$$\text{CIAI} = \text{TC} - \text{PCIFS}$$

Where,

TC = Total Cost (Fixed Cost + Variable Cost).

PCIFS = Paid out cost of integrated farming system.

Employment Generation

The extent of employment generation in different farming systems was worked out. Human labour

employment in farming system was calculated by taking time spent in performing various operations. Male, female and child labour engaged in farming systems were computed separately. All types of labour (male, female and child labour) used in different livestock and crop production operations were converted into man equivalent days.

RESULTS AND DISCUSSION

Existing farming systems in the study area

There were number of farming systems existed in the study area. Farming system is a combination of crops, vegetables, orchards, dairy enterprise and poultry to maximize the farm income. In the present study irrespective of the rainfed and irrigated condition, four farming systems were prominently observed. They were:

FS-I : Crops + Vegetable (C+V)

FS-II : Crops + Dairy (C+D)

FS-III : Crops + Dairy+ Goat (C+D+G)

FS-IV : Crops +Poultry + Goat + Orchard(C+ Po+ G+O)

Comparison of Cost and Return in Existing Farming Systems in the Study Area

A comparison of cost and return in rainfed and irrigated conditions in all the farming systems of both the districts is presented here.

Rainfed Condition

The comparison of cost and return are presented in Table 2. The total cost in rainfed farming system was the lowest in FS-I and the highest in FS-III in the district. It varied from ₹ 62076.55 in FS-I to ₹176933.10 in FS-III in the district where as total variable cost as percentage of total cost varied from 81.12 in FS-II to 85.10 in FS-I in the district. The total fixed cost among the four farming systems in the district varied from 14.90 per cent to 18.88 per cent, respectively. The lowest and highest total fixed cost was found in FS-I (14.90%) and in FS-II (18.88%) in the district. The reason of highest total fixed cost in FS-II was due to pacca constructed cattle shed in the district.

The net return among the four farming systems of Chittorgarh district varied from ₹ 22281.62 in FS-I to ₹ 80146.05 in FS-III. The highest net return came from FS-III (₹ 80146.05) due to goat and dairy enterprises were taken up. The return per rupee investment in the district varied from ₹ 1.29 in FS-II to ₹ 1.55 in FS-IV. In all the farming systems the overall return per rupee invested was more than one showed that all the systems were profitable in this district.

Table 1: Existing Farming Systems in Chittorgarh district of Rajasthan

Farming System	Rainfed	Irrigated
FS-I	Crop + Vegetable (C+V)	Crop + Vegetable (C+V)
FS-II	Crop + Dairy (C+D)	Crop + Dairy (C+D)
FS-III	Crop + Dairy + Goat (C+D+G)	Crop + Dairy + Goat (C+D+G)
FS-IV	Crop +Goat +Poultry (C+G+Po)	Crop + Goat + Orchard (C+G+O)

It can be concluded that on the net return and return per rupee investment basis FS-III and FS-IV were found more profitable than other farming systems where dairy cattle/poultry was one of the component of those farming system.

Irrigated Condition

The comparison of cost and return of different farming systems adopted in irrigated condition in the selected district is presented in Table 2. Data shows that the total cost in irrigated farming system were the lowest in FS-I (₹ 233367.79) and highest in FS-II (₹ 283015.07) in the district. Total variable cost as percentage of total cost varied from 81.63 per cent in FS-IV to 86.31 per cent in FS-I in the district. It can be observed that total fixed cost among four farming systems in the district varied from 13.69 per cent (FS-I) to 18.37 (FS-IV) per cent. Thus, the lowest and the highest fixed cost came out in FS-I and FS-IV in the district. However, in FS-IV crops, goat rearing and orchard were taken up, the reason for the highest total fixed cost in FS-IV as more investment was required for the establishment of orchard and to construct pacca shed for goat. Gross return in the district varied from ₹ 389835.25

Table 2: Comparison of Cost and Return in Rainfed & Irrigated Farming Systems in Study Area (₹/Farm/Year)

Particulars	Chittorgarh District (Rainfed)				Chittorgarh District (Irrigated)			
	FS-I	FS-II	FS-III	FS-IV	FS-I	FS-II	FS-III	FS-IV
Cost								
TVC	52826.55	118158.15	150403.10	104458.95	201410.27	238354.95	230759.10	218613.80
	(85.10)	(81.12)	(85.01)	(83.58)	(86.31)	(84.62)	(82.25)	(81.63)
TFC	9250.00	27505.29	26530.00	20525.00	31957.52	44660.12	49793.37	49193.37
	(14.90)	(18.88)	(14.99)	(16.42)	(13.69)	(15.78)	(17.75)	(18.37)
TC	62076.55	145663.44	176933.10	124983.95	233367.79	283015.07	280552.47	267807.17
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Return								
GR	84358.17	188109.33	257079.15	194058.50	394983.16	389835.25	409432.06	407128.71
NR	22281.62	42445.89	80146.05	69074.55	162689.87	106820.18	128879.59	139321.54
Return/ Rupee Investment	1.36	1.29	1.45	1.55	1.69	1.38	1.46	1.52

in FS-II to ₹ 409432.06 in FS-III. Thus, in the district the gross return were lowest in FS-II and highest in FS-III. The net return varied from ₹ 106820.18 (FS-II) to ₹ 162689.87 (FS-I) in the district while return per rupee investment varied from ₹ 1.38 (FS-II) to ₹ 1.69 (FS-I). The reason for getting higher net return as well as return per rupee investment in FS-I in the district was due to growing of vegetables in this system which were more remunerative than dairy. Thus, it was concluded that on the least cost, net return and return per rupee investment basis the FS-I was more profitable than other farming systems in the district. All the systems under irrigated condition gave more than ₹ 1.38 per rupee invested.

Farm Income and Employment Generation

Rainfed Condition of Chittorgarh District: The per farm income and employment were presented in Table 3. Maximum net income per farm was generated from FS-III (₹ 80146) followed by FS-IV (₹ 69075), FS-II (₹ 42446) and it was minimum in FS-I (₹ 37515). Net income per hectare was maximum in FS-IV (₹ 138150) and it was minimum in FS-I (₹ 32,908). Per farm maximum employment generation was observed in FS-II (356.6 man-days) followed by FS-I (247.56 man-days), FS-III (231.89 man-days) and the minimum in FS-IV (191.50 man-days). On per hectare

basis the maximum employment was generated by FS-IV (383.50 man-days) and lowest in FS-I (217.15 man-days). On per farm basis net income and employment generated in rainfed area was maximum on FS-III and FS-II, respectively while on per hectare basis net income as well as employment generated were maximum on FS-IV. On an average per farm net income and employment generated was ₹ 57296 and 252.43 man-days per year respectively in rainfed areas of the district. The income and employment generated per hectare was maximum in FS-IV as in this farming system goats and poultry enterprises were there.

Irrigated Condition of Chittorgarh Districts: The per farm, farm income and employment were presented in Table 4. Maximum net income per farm was generated from FS-I (₹ 162690) followed by FS-IV (₹ 139322), FS-III (₹ 128880) and it was minimum in FS-II (₹ 106820). The maximum net income per hectare was found in FS-IV (₹ 142165) and it was minimum in FS-II (₹ 89017). Employment generation per farm was maximum in FS-I (693.05 man-days) because of crops and vegetable activities and it was minimum in FS-II (593.05 man-days) while the employment generated per hectare was maximum (666.89 man-days) in FS-IV and it was minimum in FS-II (494.21 man-days). FS-IV generated maximum net income and employment

Table 3: Farm Income and Employment Generated in Rainfed Farming System (Chittorgarh)

Sl. No.	Particulars	Units	FS-I	FS-II	FS-III	FS-IV	Overall
I	Income						
A	Net Income /farm	₹/Farm	37515	42446	80146	69075	57296
B	Net Income /ha	₹/Farm	32908	36279	133577	138150	85229
C	Land holding size	Ha	1.14	1.17	0.60	0.50	0.85
II	Employment						
A	Employment /farm	Mandays/farm	247.56	356.6	213.89	191.68	252.43
B	Employment/ha.	Mandays/ha	217.15	304.7	356.49	383.36	315.43

Table 4: Farm Income and Employment generated in Irrigated Farming System (Chittorgarh)

Sl. No.	Particulars	Units	FS-I	FS-II	FS-III	FS-IV	Overall
I	Income						
A	Net Income /farm	₹/Farm	162690	106820	128880	139322	134428
B	Net Income per ha.	₹/ha.	140250	89017	117164	142165	121106
C	Land holding size	Ha.	1.16	1.20	1.10	0.98	1.11
II	Employment						
A	Employment /farm	Mandays/ farm	693.05	593.05	598.05	653.56	634.42
B	Employment/ha.	Mandays/ha	597.46	494.21	543.68	666.89	571.55

Table 5: Internal Cost Adjustments in Various Farming Systems in Study Area

Integrated Farming systems	Gross return (₹)	Within Farming System (₹)	Cost	Total Cost (₹)	Cost Share (%)		Return/ Cost Ratio
			Out Side Farming System (₹)		Within Farming System	Out Side Farming System	
Chittorgarh – Rainfed							
FS-I	138716.34	61773.42	39428.12	101201.54	61.04	38.96	1.37
FS-II	188109.33	95147.36	50516.08	145663.44	65.32	34.68	1.29
FS-III	257079.15	124224.73	52708.37	176933.10	70.21	29.79	1.45
FS-IV	194058.50	70628.43	54355.52	124983.95	56.51	43.49	1.55
Overall	194490.83	86803.60	50391.91	137195.51	63.27	36.73	1.42
Chittorgarh – Irrigated							
FS-I	394983.16	137943.70	95424.09	233367.79	59.11	40.89	1.69
FS-II	389835.25	179403.25	103611.82	283015.07	63.39	36.61	1.38
FS-III	409432.06	180535.51	100016.96	280552.47	64.35	35.65	1.46
FS-IV	407128.71	156345.83	111461.34	267807.17	58.38	41.62	1.52
Overall	400344.80	163191.75	102993.87	266185.63	61.3075	38.6925	1.50

per hectare due to goats and orchard activities. Thus net income and employment generated on per farm basis in irrigated area of the district were highest in FS-I while on per hectare basis these were found highest in FS-IV. The overall net income and

employment generated was ₹ 134428.00 and 634.43, respectively in irrigated condition of the district.

The net income and employment per farm basis generated in rainfed area was maximum in FS-III (Crop+Goats+Dairy) and FS-II (Crop+Dairy),

respectively in the district. In irrigated area of Chittorgarh district net income and employment generated on per farm basis were highest in FS-I (Crop + Vegetables). On per hectare basis net income and employment generated in rainfed area of the district was found in FS-IV (Crop+Goat+Poultry). In irrigated area on net income and employment generation per hectare basis FS-IV (Crop + Goat + Orchard) in the district found most profitable.

Internal Cost Adjustments in Various Farming Systems: The cost involved in various activities on different farming systems were divided into two parts *i.e.* cost incurred within the farming system and cost incurred from outside the farming system. Cost from within farming system included the value of all those inputs required for different enterprises and are supplied from within the system like FYM cost, owned labour, green/dry fodder, seed and feed. The value of the inputs brought from outside the farm (or farming system) for different enterprises were included in the cost incurred outside the farming system. The system is more feasible and sustainable when there is more utilization of resources within the system than the other system. On cost adjustment basis, FS-III was more profitable in both the conditions while on per rupee investment criteria. FS-IV (₹ 1.55) in rainfed and FS-I (₹ 1.69) in irrigated condition of the district gave more return (Table 5). Thus, internal cost adjustment was more in FS-III among all the farming systems in rainfed and irrigated condition while the return per rupee investment (return-cost ratio) was more in FS-IV in rainfed condition and in FS-I in irrigated condition among the other farming systems in the districts.

CONCLUSION

The present investigation was under taken to find out income and employment generation in existing farming systems in Chittorgarh district of Southern Rajasthan during 2012-13. A total sample of 60 household consisting of 30 under rainfed and 30 under irrigated situation was selected for the study. Four farming systems were existed in both the rainfed and irrigated areas of Banswara district viz. FS-I: Crop+Vegetables (C+V), FS-II: Crop + Dairy (C+D), FS-III:

Crop + Dairy +Goat (C+D+G), FS-IV: Crop + Goat + Poultry + Orchard (C+G+PO +O). On per farm basis maximum net income and employment generated in rainfed area was maximum on FS-III (₹ 80146) and FS-II(356.6 man-days), respectively while on per hectare basis net income as well as employment generated were maximum on FS-IV(₹138150) and (383.50 man-days).

Net income and employment generated on per farm basis in irrigated area of the district were highest in FS-I (₹ 162690) and (693.05 man-days), respectively while on per hectare basis these were found highest in FS-IV (₹ 142165) and (666.89 man-days).

The net income and employment per farm basis generated in rainfed area was maximum in FS-III (Crop + Goats + Dairy) and FS-II (Crop + Dairy), respectively in the district. In irrigated area of the district net income and employment generated on per farm basis were highest in FS-I (Crop + Vegetables). On per hectare basis net income and employment generated in rainfed area of the district was found in FS-IV (Crop + Goat + Poultry). In irrigated area on net income and employment generation per hectare basis FS-IV (Crop + Goat + Orchard) in the district found most profitable.

On cost adjustment basis, FS-III was more profitable in both the conditions while on per rupee investment criteria. FS-IV (₹ 1.55) in rainfed and FS-I (₹ 1.69) in irrigated condition of the district gave more return. Thus, internal cost adjustment was more in FS-III among all the farming systems in rainfed and irrigated condition while the return per rupee investment (return-cost ratio) was more in FS-IV in rainfed condition and in FS-I in irrigated condition among the other farming systems in the districts.

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