Income and employment generation under existing farming systems in tribal dominated Banswara district of Southern Rajasthan

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ABSTRACT

Rajasthan is the largest state of India constituting 10.4 per cent of total geographical area and 5.67 per cent of total population of India. The present investigation was under taken to work out the income and employment under existing farming systems in tribal dominant Banswara district of Southern Rajasthan during 2012-13. A sample of 60 households consisting of 30 each under rainfed and irrigated situation was selected for the study. Four farming systems were existed in both the rainfed and irrigated situations of Banswara district viz. FS-I: Crop+ Vegetables (C+V), FS-II: Crop + Dairy (C+D), FS-III: Crop + Dairy +Goat (C+D+G) and FS-IV: Crop + Goat +Poultry +Orchard (C+G +Po+O). The total cost in rainfed farming system was the lowest in FS-I (₹ 59707.15) and the highest in FS-III (₹ 166716.75). The total costs in irrigated farming system were the lowest in FS-I (₹ 232289.97) and highest in FS-III (₹ 292409.27). On the basis of net return per household, the most profitable farming system adopted under the rainfed situation was FS-III (Crop+Goat+Dairy) with ₹ 57600.95 per farm while on the basis of returns per rupee investment; it was FS-IV (Crop+Goat+Poultry) i.e. ₹ 1.57. While under irrigated situation, FS-I (Crop+Vegetable) was the most profitable farming system on net return basis (₹ 147287) and returns per rupee investment i.e. ₹ 1.63. On per farm basis employment generated in rainfed and irrigated conditions were found maximum in FS-II (197.76 man days) and FS-IV (626.60 man days) in the district, respectively. In irrigated condition the employment generation was more in the district as crop,poultry and orchard activities were included in FS-IV which utilized more of family labour resulted to maximum employment.

Keywords: Income, employment, farming system, cost return ratio and profitability

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Integrated Farming System is the result of complex interaction among a number of interdependent components, where an individual farmer allocates certain quantities and qualities of four factors of production, namely land, labour, capital and management to which he has access (Mahapatra, 1994). IFS is a multidisciplinary whole farm approach and very effective in solving the

problems of small and marginal farmers. The approach aims at increasing income and employment from small-holding by integrating various farm enterprises and recycling crop residues and by products within the farm itself. (Behera *et al*. 1999 and Singh *et al*. 2006) It also ensures optimization of resource use, minimization of risk and generation of employment. The basic aim of integrated / sustainable farming system is to derive a set of resource management and utilization practices that lead to a substantial and sustained increase in agriculture production. Since farming system differ in different situation, the 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.

Rajasthan is the largest state of India constituting 10.4 per cent of total geographical area and 5.67 per cent of total population of India (GoI, 2011a). About 65 per cent population (56.5 million) of the state are dependent on agriculture and allied activities for their livelihood. The three major canal irrigations, other than the vast area under arid and dry lands offer great help for agricultural development of the state. Agriculture in Rajasthan is primarily rainfed covering country's 13.27 per cent of available land. 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.* Humid Southern Plains Zone (IVB) 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 different farming models yield different level of incomes and employment at farm household levels. Thus, present study was carried out to find out income and employment in existing farming system in tribal dominated Banswara district.

DATABASE AND METHODOLOGY

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 Banswara is highly-tribal dominated district. Banswara district from IV-B was purposively selected for the study of integrated farming systems, as this district have high potential for development of agriculture and livestock. Two tehsils from Banswara district were selected in such a way that one having highest proportion of irrigated area *i.e.* Banswara and other one having highest share of rainfed area *i.e.* Kushalgarh to total net sown area of the district so that selected tehsils represented irrigated and rainfed farming systems in tribal areas. Two villages from each tehsil were selected randomly. Two villages from each tehsil were selected were selected randomly. Fifteen farmers from each village were also randomly selected. Thus, a total sample of 60 households was selected from Banswara district, representing 30 households from rainfed and 30 households from irrigated farming systems. The primary data on cost and returns were collected from selected farmers. The data collected for the year 2012-13 were scrutinized, tabulated and analyzed by using different analytical tools.

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.

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.

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

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

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. Gross income from integrated farming system (GIIFS) was worked out as:

$$GIFS = \sum_{i=1}^{n} Qi.Pi$$

Where, Qi is the Physical output (main and by product) of ith component of IFS and Pi is the price of ith output.

Paid out cost of Integrated Farming Systems (PCIFS) was work out as:

$$PCIFS = \sum_{i=1}^{n} xi.pi$$

Where,

xi = the ith external input in quantity term

pi = the price of ith external input

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

$$NIIFS = GIIFS - PCIFS$$

Cost of Internally Adjusted Input (CIAI) = TC-PCIFS

Where,

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

PCIFS = Paid out cost of integrated farming system.

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

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) and FS–IV: Crops + Goat + Poultry + Orchard(C+G + Po +O).

Mainly there were four farming systems prevalent in the rainfed and irrigated condition of Banswara district. Mostly FS-I describes the crops plus vegetables and crops plus dairy cattle forms FS II. Crops plus dairy cattle plus goats constituted the FS-III. Crops supported by poultry and/or orchard were the part of FS-IV in both the situation of the selected tehsils.

Cost and return in different farming systems adopted by the households in rainfed and irrigated condition of the district were computed and presented in Table 2.

Table 1: Existing farming systems in study area

Farming System	Banswara	
	Rainfed	Irrigated
	Description	
FS-I	Crop + Onion Nursery (C+ON)	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 + Poultry (C+Po)	Crop+Poultry+ Orchard (C+Po+O)

The total cost in rainfed farming system was the lowest in FS-I and the highest in FS-III. It varied from ₹ 59707.15 in FS-I to ₹ 166716.75 in FS-III. Total variable cost as percentage of total cost varied from 74.69 in FS IV to 86.97 in FS-II. The total fixed cost among the four farming systems in the district varied from 13.03 per cent to 25.31 per cent, respectively. The lowest total fixed cost was 13.03 per cent in FS-II. The highest total fixed cost *i.e.* 25.31 per cent was seen in FS-IV. The reason of highest total fixed cost in FS-IV was due to poultry which needed more capital for construction of pacca poultry shed. The net return among the four farming

systems varied from ₹ 24943.38 in FS-I to ₹ 57600.95 in FS-III. The households in FS-I taken only kharif crop and onion nursery which gave lowest net returns whereas in FS-III farmers reared goat and dairy enterprises along with crop, gave highest net returns. The returns per rupee investment in the rainfed condition of Banswara district was varied from ₹ 1.35 in FS-III to ₹ 1.57 in FS-IV. In all the farming systems the overall returns per rupee invested was more than one showed that all the systems were profitable in the district.

Thus, it can be concluded that on the basis of net return FS-III and returns per rupee investment basis FS-IV was found more profitable than other farming systems, where livestock/poultry was one of the component of these farming systems.

The comparison of cost and return of different farming systems adopted in irrigated condition are presented in Table 2. Data shows that the total cost in irrigated farming system was the lowest in FS-I (₹ 232289.97) and the highest in FS-III (₹ 292409.27). Total variable cost as percentage of total cost varied from 80.97 per cent in FS-IV to 87.44 per cent in FS-I.

Table 2: Comparison of costs and returns in rainfed and irrigated farming systems in Banswara district

(₹/Farm/Year)

Particulars	Rainfed Condition				Irrigated Condition			
	FS-I	FS-II	FS-III	FS-IV	FS-I	FS-II	FS-III	FS-IV
Costs								
TVC	49952.65 (83.66)	100295.25 (86.97)	141277.25 (84.74)	71209.15 (74.69)	203116.10 (87.44)	233951.80 (86.01)	243916.15 (83.42)	201613.80 (80.97)
TFC	9754.50 (16.34)	15025.00 (13.03)	25439.50 (15.26)	24130.00 (25.31)	29173.87 (12.56)	38062.22 (13.99)	48493.12 (16.58)	47399.63 (19.03)
TC	59707.15 (100)	115320.25 (100)	166716.75 (100)	95339.15 (100)	232289.97 (100)	272014.02 (100)	292409.27 (100)	249013.43 (100)
Returns								
GR	84650.53	161595.60	224317.70	150087.00	379576.51	376280.90	410509.01	369815.75
NR	24943.38	46275.35	57600.95	54747.85	147286.54	104266.88	118099.74	120802.32
Returns/Rupee Investment	1.42	1.40	1.35	1.57	1.63	1.38	1.40	1.49

TVC=Total Variable Costs, TFC=Total Fixed Costs, TC=Total Costs, GR=Gross Return and NR=Net Return

The total fixed cost among the four farming systems varied from 12.56 per cent (FS-I) to 19.03 per cent (FS-IV). The reason for the highest total fixed cost in FS-IV due to more investment was required for the establishment of orchard and to construct pacca shed for poultry birds. The net returns varied from ₹ 104266.88 (FS-II) to ₹ 147286.54 (FS-I). Returns per rupee investment varied from ₹ 1.38 (FS-II) to ₹ 1.63 (FS-I) in irrigated condition. The reason for getting higher net returns as well as returns per rupee investment in FS-I was due to growing of vegetables in this system which was more remunerative than dairy.

The in-depth look of the table also showed that net return and returns per rupee investment in FS-I was more in compared to other systems irrigated condition. Thus, it can be concluded that on the least cost, net returns and returns 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 on per rupee invested.

Farming system aimed at efficient use of resources to maximize the farm income. It also minimizes production risk by spreading the risk to various enterprises instead of one activity. Labour employment plays an important role in the realization of any farm family goals in farming system. The quantum of income and employment generated under various farming systems by the households in the rainfed and irrigated areas of the district are discussed separately.

It was observed from Table 3 that out of four farming systems of rainfed area of Banswara district, maximum net income per farm was generated from FS-III (₹ 57,601) followed by FS-IV (₹ 54748), FS-II (₹ 46275) and it was minimum in FS-I (₹ 24,943). Net income on per hectare basis was maximum in FS-IV (₹ 1,14,058) due to poultry enterprises FS-IV got highest net income followed by FS-III (₹ 1,12,943), FS-II (₹ 51,417) and it was minimum in FS-I (₹ 40,231). Kumar *et al*. (2012) also reported that crop + poultry+ fish +goat given the highest net income (₹ 1,59,485/year) and employment generation (752 mandays/year).

Table 3: Farm income and employment generated in rainfed farming system

Sl. No.	Particulars	Units	FS-I	FS-II	FS-III	FS-IV	Overall
1	Income						
A	Net Income/farm	₹/Farm	24943	46275	57601	54748	45892
B	Net Income /ha	₹/ha	40231	51417	112943	114058	79124
C	Average land holding	Ha	0.62	0.90	0.51	0.48	0.63
II	Employment						
A	Employment /farm	Mandays/farm	144.49	197.76	192.19	175.92	177.59
B	Employment/ha.	Mandays/ha	233.04	219.73	376.84	366.50	281.88

The per farm employment generation was maximum in FS-II (197.76 mandays) followed by FS-III (192.19 man-days), FS-IV (175.92) and minimum in FS-I (144.49 man-days) due to dairy and goat activities. While employment generation on per hectare basis was maximum in FS-III (376.84 man-days) followed by FS-IV (366.50 man-days), FS-I (233.04 man-days) and it was minimum in FS-II (219.73 man-days). FS-III generated highest employment per hectare due to dairy and goat activities. Thus, it can be concluded that maximum net income generated per farm was the highest in FS-III while net income on per hectare basis was the highest in FS-IV. Highest per farm and per hectare employment were recorded in FS-II and FS-III, respectively. The mandays employment per farm was highest in FS-II and employment per hectare was recorded highest in FS-III. The overall net income and employment generated on per household basis was ₹ 45,892 and 177.59 man-

days in rainfed area. Similar findings were reported by Ramrao *et al.* (2005) and Singh and Gangwar (2010).

The income and employment generated in irrigated farming system is presented in Table 4. Net income per farm was the highest in FS-I i.e. ₹ 147287 due to more

remunerative prices realized by the households in vegetables and it was lowest in FS-II i.e. ₹ 104267 while net income per hectare varied from ₹ 94788 in FS-II to ₹ 219604 in FS-IV.

Table 4: Farm income and employment generated in irrigated farming systems

Sl. No.	Particulars	Units	FS-I	FS-II	FS-III	FS-IV	Overall
1				**Income**			
A	Net Income/ farm	₹/Farm	147287	104267	118100	120802	122614
B	Net Income/ha.	₹/ha.	171263	94788	187460	219640	1552076
C	Land holding size	Ha	0.86	1.10	0.63	0.55	0.79
2				**Employment**			
A	Employment / farm	Man-days/ farm	597.53	504.84	458.08	626.60	412.76
B	Employment/ ha.	Man-days/ha	694.80	458.94	727.11	1139.27	522.48

Maximum per farm employment was generated in FS-IV (626.60 man-days) followed FS-I (597.53 man-days), FS-II (504.84 man-days) and it was minimum in FS-III (458.08 man-days). On per hectare basis the maximum employment generated by FS-IV (1139.27 man-days) followed by FS-III (727.11 man-days), FS-I (694.80 man-days) and it was minimum in FS-II (458.94 man-days). In FS-IV which includes poultry and orchard activities, there was more utilization of family labour which resulted to highest employment. Thus, it can be concluded that in FS-I the maximum net income per farm generated whereas in FS-IV maximum net income per hectare was found. While the employment generation was maximum in FS-II on per farm basis and on per hectare basis it was found in FS-IV. The overall net income and employment generated was ₹ 122614 and 412.76 man-days in irrigated condition of Banswara district.

Per farm net income and employment generated in rainfed condition were maximum on FS-III (Crop+Goat+Dairy) and FS-II (Crop+Dairy), respectively. In irrigated area FS-I (Crop+Vegetables) generated the maximum net income per farm while employment generated was

maximum in FS-IV (Crop+Poultry+Orchard). On per household basis in rainfed area on net income per household basis FS-IV (Crop+ Poultry) found profitable and on employment basis FS-III (Crop+ Goat +Dairy) found better. FS-IV (Crop+ Poultry + Orchard) found most profitable in irrigated area of the district on net income and employment generation per household basis.

Conclusion

The present investigation was under taken to work out income and employment of existing farming systems in tribal dominated Banswara district of Southern Rajasthan during 2012-13. A sample of 60 household consisting of 30 each under rainfed and irrigated situations 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). The total cost in rainfed farming system was the lowest in FS-I (₹ 59707.15) and the highest in FS-III (₹ 166716.75). Total variable cost as percentage of

total cost varied from 74.69 in FS IV to 86.97 in FS-II. The total fixed cost among the four farming systems in the district varied from 13.03 per cent to 25.31 per cent, respectively. The total costs in irrigated farming system were the lowest in FS-I (₹ 232289.97) and highest in FS-III (₹ 292409.27). Total variable costs as percentage of total costs varied from 80.97 per cent in FS-IV to 87.44 per cent in FS-I. The total fixed cost among the four farming systems varied from 12.56 per cent (FS-I) to 19.03 per cent (FS-IV).On the basis of net return per household, the most profitable farming system adopted under the rainfed situation was FS-III (Crop+Goat+Dairy) with ₹ 57601.00 per farm while on the basis of returns per rupee investment, it was FS-IV (Crop+Goat+Poultry) i.e. ₹ 1.57. While under irrigated situation, FS-I (Crop+Vegetable) was the most profitable farming system on net return basis (₹ 147287) and returns per rupee investment i.e. ₹ 1.63.

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