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Comparative evaluation of traditional and improved farming practices in Tripura

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ABSTRACT

The improved farming with various animal and crop components can play a significant role in increasing manifold production, income, and nutrition and employment opportunities of rural populations. The present survey work was carried out at sixty farmers' plots covering a total area of 40.2 ha in Dhalai district of Tripura during the year 2012–13 to assess the production and income from traditional and improved methods of farming practised by the rural farm households. Production of seven different components like fish, paddy, piggery, dairy, poultry, vegetables and fruit crops production were employed in the investigation. The results revealed that the performance of all components is better in improved farming over traditional management. The average productivity of different components was significantly higher in improved farming as compared to the traditional farming. The improved farming system gave higher net return and benefit cost ratio to the farmers as compared to traditional farming. The overall result revealed that the improved practice with different crop and animal components is an excellent approach for sustainable production, income generation and employment opportunity of the resource poor rural households of Tripura.

Key words: Economic return, Farm productivity, Improved farming, Traditional farming

The agricultural sector is the largest contributor to the economy of Tripura state. Besides striving to meet the food requirement, the sector has a strong impact on the needs and overall quality of life of the people of Tripura. More than 75% of the state's total workforce is still dependent on agriculture for their subsistence. The ICAR and state departments have been trying to alleviate farmers' problems through introduction of new technologies, fertilizers, improved seeds and protective chemicals since their inception in Tripura.

The agricultural production and productivity depends largely on the quality of land and sustainable practices. A balance between efficient and productive agricultural enterprise and environmental protection and sustainability is important to make agriculture sector an economically viable venture. In the recent decade, the achievement of self-sufficiency in food production in various states was accorded high priority in the food policies of the country. Tripura, one among the north eastern states of India is also successful in achieving self-sufficiency in various sectors by increasing its food production in manifolds. But it has not yet solved the problem of chronic food security at the household level and year to year fluctuations in food production. The agricultural production of the state is not in the pace with population growth at 14.75% per decade. Now this shortage in agricultural production is because of traditional farming or due to non-adaptation of recommended technologies in improved farming systems. To find out the answers of these questions a survey was conducted in Dhalai district of Tripura, which is considered as one of the backward districts of the state.

MATERIALS AND METHODS

The study was conducted in the Dhalai district of Tripura during 2012–13. A total of 60 farmers, with a cluster of thirty farmers for improved farming systems (IMFS) and thirty for traditional farming system (TFS) were surveyed for this study. The average holding of each farmer was 0.67 ha (Table 1). Seven components, i e fish, paddy, piggery, dairy, poultry, vegetables and fruit crops were studied for comparisons based on the criteria as mentioned in Table 2 and 3. During the study period, the scientific personnel from ICAR Tripura Centre have visited the farmers' household on

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Table 1 Area under different components in farming systems

Components	Area (ha)
Pond	0.10 ± 0.002
Paddy	0.32 ± 0.005
Vegetables	0.20 ± 0.0024
Pig farming	0.002 ± 0.000024
Dairy	0.01 ± 0.00037
Backyard poultry	0.005 ± 0.00012
Fruit crops	0.03 ± 0.0012
Total	0.67 ± 0.011

pre-scheduled time and collected necessary information from interviews using structured questionnaires. The interviews were conducted individually as well as in groups with the respondents. However, while interviewing in the groups, participant observation method was also employed to observe the farmers' perceptions and recording knowledge on profitability of different farming systems. Several visits in the rural areas were conducted to collect the information and verification of these practices. The data on cost of different inputs and return from outputs for different systems (TFS, and IMFS) were also recorded for each farmer. The data collected were analyzed through the use of descriptive statistics using means and standard error of explaining the outcomes of findings.

RESULTS AND DISCUSSION

Fish production

Fisheries play an important role in the economy of Tripura, as fish constitute one of the vital items in the diet of 95% of its population (Dey and Ghoshal 2011). In the present study the fish production as a major component of the farming systems of Tripura was showed encouraging results. The average per hectare fish productivity was recorded 934.25 kg in TFS and 1 557.12 kg in IMFS, i e 66.67% higher over the traditional system (Fig 1A). An additional production of 99.66 kg fish in improved farming might be due to adoption of scientific fish culture practices. Probably the cumulative effect of maintaining proper ratios of fingerlings with area and different layers of water bodies and uniform feed supply accelerated better fish growth resulted in increased fish production. This result supports the findings made by Alam *et al.* (2009).

Pig rearing

Pig farming is one of the major animal husbandry activities in Tripura, where pork consumption is most common. The indigenous tribal population which contributes one-third of the total population in the state gives highest preference to pork meat in their daily meals although these days pork is also very popular amongst the non-tribal.

Table 2 Criteria describing the selection of the farming systems

Components	Criteria	TFS	IMFS
Fish culture	Stocking density	Bellow stocking density	Proper stocking density
	Feed supplementation	Natural food	Natural+ external feed
	Fertilization	Raw cow dung	Fertilization with organic + inorganic fertilizers
Pig farming	Breed	Local breeds	Local + improved
	Feed	Based on household wastage	Quality feed
	Health management		Vaccination, deworming etc
Dairy farming	Breed	Local	Local
	Feed	Grazing	Grazing + urea molasses
	Health management		Vaccination, deworming etc
Poultry rearing	Breed	Local	Improved birds
	Feed	Scavenging	Scavenging + quality feed
	Health management		Vaccination
Paddy cultivation	Seed variety	Local or old seeds of improved varieties	Quality seeds of improved varieties
	Method of cultivation	Traditional	SRI or ICM
	Weed management	Hand weeding	Conoweeding
Vegetable production	Seed quality	Uncertified seeds	Certified seeds
	Manure and fertilizer application	Bellow recommended dose	Balance application
Fruit Crops	Variety	Local fruits	Amrapalli
	Training and pruning		Timely
	Fertilization		Small dose of fertilizers

Table 3 Crop and animal varieties under different farming systems

Farming system	TFS	IMFS
Fish	Catla, rohu, mrigal	Catla, rohu, mrigal, grass carp, common carp etc
Pig	Mali, Dome	Cross breeds
Dairy	Local non-descript type	Local non-descript type, cross breeds
Birds	Local non-descript type	Gramapriya, Cross
Paddy	Pyzum, Kalikhasa, Binni, Swarna	Swarna, Samba masuri, Ranjit, MTU-1010
Vegetable	Local varieties	Cabbage (Pusa Drum Head), Cauliflower (Snow Ball)
Fruit Crops	Local fruits	Amrapalli, Bombai litchi

Table 4 Variable costs and gross returns of different component of farming systems

Components	Variable cost		Gross returns	
	TFS	IMFS	TFS	IMFS
Pond	4825.76±85.31	7786.53±158.60	14948.28±336.92	24913.79±561.53
Paddy	4556.83±102.92	6832.89±260.86	9548.28±157.62	15913.79±262.69
Vegetables	12537.48±83.80	15906.20±278.57	35137.93±256.56	45000±558.33
Pig	3964.76±134.84	5204.88±86.44	23431.03±376.05	33056.89±221.01
Cattle	9996.29±95.62	12984.06±476.97	31034.48±366.33	40275.86±1484.65
Birds	932.29±35.03	1048.46±29.38	3227.59±95.06	3972.41±95.06
Fruit crops	782.23±15.51	922.97±47.37	2337.93±26.86	2982.76±122.78
Total	41205.15±162.61	55706.78±1144.97	119665.50±568.98	166115.50±2751.26

Table 5 Net returns and benefit cost ratio (BCR) of different component of farming systems

Components	Variable cost		Gross returns	
	TFS	IMFS	TFS	IMFS
Pond	10122.52±262.63	17127.26±407.76	3.09±0.03	3.19±0.01
Paddy	4991.44±62.08	9080.90±90.33	2.10±0.013	2.37±0.04
Vegetables	22600.45±207.95	29093.8±328.80	2.80±0.01	2.83±0.02
Pig	19821.50±241.74	28036.11±143.86	6.49±0.01	6.58±0.02
Cattle	21038.19±281.01	27291.81±1014.61	3.10±0.01	3.10±0.01
Birds	2295.29±60.21	2923.95±66.52	3.49±0.03	3.80±0.02
Fruit crops	1555.71±20.96	2059.78±76.66	3.01±0.04	3.27±0.03

Scientific piggery is a profitable venture because of superior feed conversion ratio, faster growth rate, short generation interval and high proliferation in pigs. The indigenous Mali and Dome variety of pigs of Tripura are smaller in size with poor feed conversion abilities and average adult body weight is about 45 kg and litter size is 4 to 5. The up-gradation of local pigs through cross breeding with the exotic pigs has given a new dimension to the piggery sector of Tripura. The improved variety of pigs grows up to 70 to 80 kg with increased litter size and carcass weight was found to be 56 to 70 % of live weight. In the present study, the litter size and carcass weight generated in IMFS was higher as compared to TFS (Fig 1A, C), which might be due to better husbandry practices followed in the improved farming. Lekule and Kyvsgaard (2003) also reported poor feed conversion, high mortality rates, low reproductive rates and poor final products in pigs in traditional method of farming.

Milk production

Dairy farming provides substantial supplementary income to the rural livelihood of Tripura. The per capita availability of milk in the State is 79 g a day as against the national average of 281 g a day. In the present study, the average milk production was recorded 29% higher in IMFS (2 013.79 litres/cow) as compared to TFS (1 551.72 litres per cow) (Fig 1D), which might be due to better feeding and health management practices. Murai and Singh (2011) and Sathiadhas *et al.* (2003) also reported that the productive performance of cattle depends heavily on the scientific dairy farming practices.

Egg production

Poultry is playing an important role for human nutrition, family income, employment and income generation in homestead. Almost every family of rural Tripura is habituated

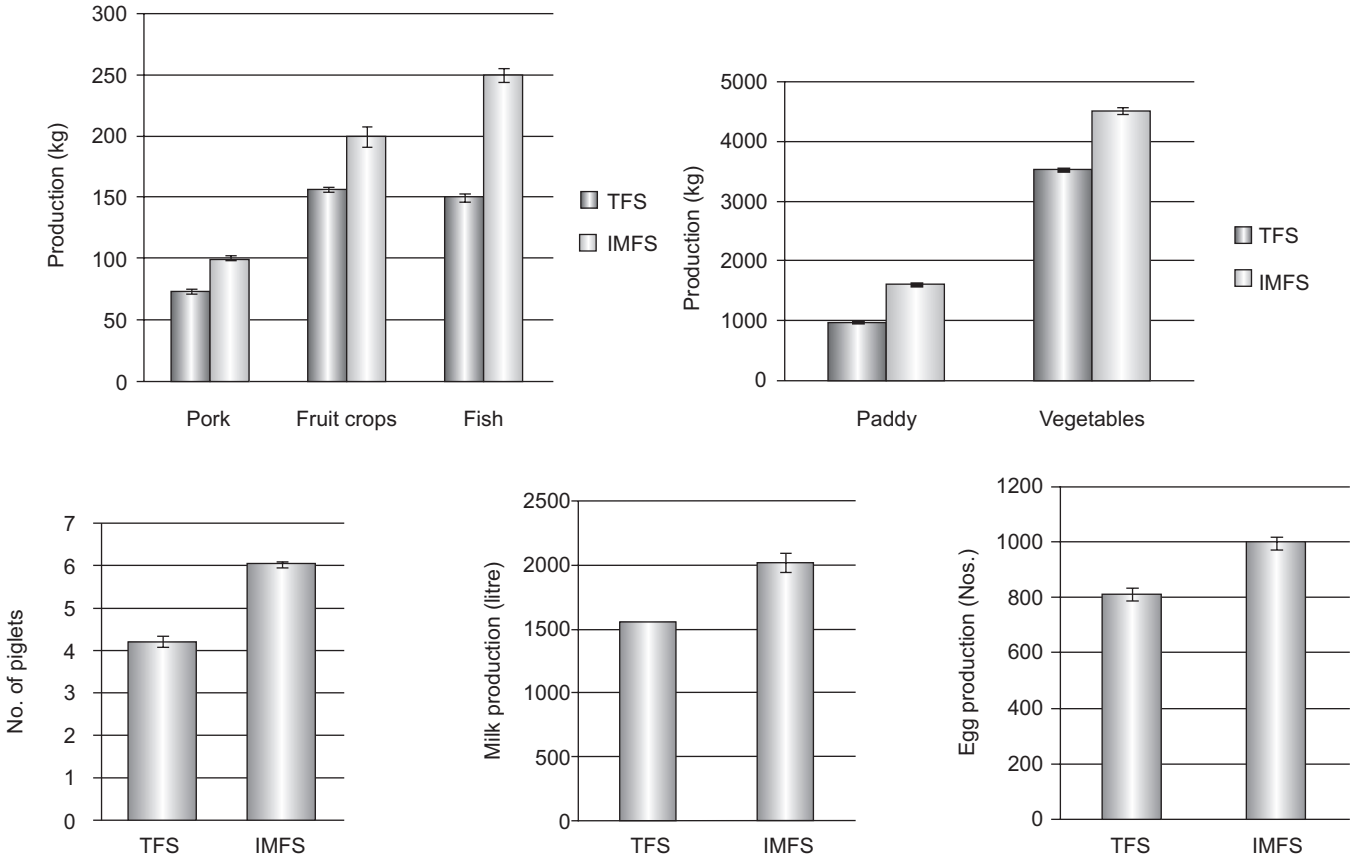

Fig 1 Production of pork, fruit and fish (A), paddy and vegetables (B), No. of piglets (C), milk production (D) and egg production (E) under traditional and improved farming system. Standard error bars indicate the standard error value.

in backyard poultry keeping and every household maintain about 6-12 chickens. Breed, stain, reproductive efficiency, and proper management system in respect to good housing, balanced feeding, proper nursing, vaccination etc are the major factors in the profitability of poultry farming. In the present study revealed the egg productivity was recorded 18.75% in IMFS as compared to TSF in Dhalai Tripura (Fig 1E), which might be due to adoption of improved birds with quality feeds and proper vaccination. Ershad (2005) also reported better performance of hybrid birds over natives in rural conditions.

Rice production

Rice is the staple food for more than 90% population of Tripura. Besides that it is the major component of all the farming system of Tripura, viz. TFS as well as IMFS. The production of rice in TFS was recorded much less in the present study as compared to rice grown under IMFS. The per hectare rice yield in improved farming was recorded to the tune of 4 973.13 kg as compared to 2 983.75 kg in traditional farming (Fig 1B). Rice grown under IMFS produced 66.67% more yield as compared to TFS. The lower yield of rice under TFS was mainly due to use of poor quality seeds, that they are procuring from neighbouring farmers and use of traditional methods in rice cultivation with very poor nutrient and weed management. Farmers who practice improved farming with certified seeds of improved varieties, viz. Samba Masuri, Swarna, Ranjit etc and scientific practices like system of intensification (SRI) with proper nutrient and weed management recorded higher rice yield. The Department of Agriculture, Governmental of Tripura also reported 60% higher yield in SRI as compared to conventional system of rice cultivation (Uphoff 2007).

Vegetable production

The form of vegetable cultivation is extended from kitchen gardening to commercial production. In Tripura vegetables are mostly grown by the farmer for household consumption and excessive produces sold out in the local markets. In the present study, the production of vegetables in IMFS was 28.09% higher as compared to TFS (Fig 1B). The higher vegetable production in improved farming system was might be due to use of quality seeds and better management practices followed by the farmers. The increase in yield of vegetables with improved practices could be attributed to improved vegetative growth, better availability of nutrients at vital growth period and greater synthesis of carbohydrates and their translocation to the storage organs.The

results supports earlier findings in vegetables (Brahma *et al.* 2010, Patel and Rajput 2003).

Fruit crop production

The horticultural crops are grown as integral components of any farming system in the form of small orchard and boundary planting. In Tripura fruits crops are grown by farmer for household consumption and excessive produces sold out in the local markets. In the present study, the production of fruit in IMFS was found to be 27.58% higher as compared to production recorded under TFS (Fig 1A). The higher fruit production in improved farming system might be due to use of quality seedlings of improved fruit varieties and better management practices followed by the farmers. The increase in fruit yield with improved practices could be attributed to improved vegetative growth, better availability of nutrients at vital growth period and greater synthesis of carbohydrates and their translocation to the storage organs. Ghosh (2008) also recorded better fruit crops production under improved practices.

Economics

Economic benefit of any farming system is the major factor for its adoption by farmers. The present study showed higher variable cost, gross returns, net returns and benefit cost (B:C) ratio in all the components of IMFS as compared to TFS. The higher variable cost in all the components of IMFS was mainly due to use of quality seed materials of improved varieties/breeds with better management practices. The higher gross returns, net returns and B:C ratios were due to more production of economic products in respective components of IMFS as compared to TFS. The lower cost of production, gross returns, net returns and B:C ratios in TFS might be due to use of poor quality seed materials of local varieties/breeds with very poor management practices just for sustaining the family livelihood. Among the components, vegetable production show higher variable cost and higher gross and net returns, but B:C ratios was higher in pig and backyard poultry faming in both the farming systems (Table 4 and 5). Overall, the IMFS show more expenditure towards variable cost and higher gross and net returns when compared to TFS. The net return is the main parameter for deciding the adoptability of a farming system. Hence the present study showed that the IMFS is more profitable and sustainable as compared to farmer's traditional farming system. Similar results were also reported by Kumar *et al.* (2011) and Alam *et al.* (2009).

Conclusion

Thus it can be concluded that improved farming with various animal and crop components can play a significant role in increasing manifold production, income, and nutrition and employment opportunities of rural populations. The overall findings in terms of production and economic returns with seven components of traditional and improved farming system in the present study in Dhalai revealed that improved farming in better over traditional farming is Tripura conditions. The improved farming system is an excellent approach for sustainable production, income generation and employment opportunity for the rural households of Tripura.

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