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FARM BUSINESS ANALYSIS UNDER ALTERNATIVE FARMING SYSTEMS IN A SELECTED AREA OF BANGLADESH

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ABSTRACT

Relative performance of alternative farming systems was studied by applying residual income measures such as gross margin, net farm income and management income. The results showed that gross margin per Taka of variable cost varied sufficiently among enterprises within each farming system. Among the individual enterprises within the crop component, vegetabale and fruits gave highest gross margin per Taka of variable cost in all the systems of farming. Among the components of the whole farm business, fish component had the highest gross margin per Taka of variable cost in all the systems of farming. Net farm income was reasonably high for all the systems. Except for the Crop-Cattle-PouItryFish system, all the systems earned negative management income. However, return to operator's labour and management was positive for all the systems. In view of the fact that many of the farm fixed resources have lower opportunity costs, it may be plausible to assume that farmers might be content with whatever positive return they earn over their composite input "labour and management".

I. INTRODUCTION

The analysis of performance of a farm business is usually done in two alternative ways: enterprise analysis and whole farm business analysis. Enterprise analysis deals with determination of profitability of individual farm enterprises by applying detailed cost accounting. In addition to accounting for the variable costs which are str<tightforward and are readily accountable, fixed costs are also allocated to individual enterprises through the appropriate criteria of apportionment.

In the whole farm business analysis, particulars relating to individual enterprises are ignored, at least at some stage of the analysis, and measures of performance are derived with respect to the whole farm business. The typical measures of success we gross output, gross margin, current ratio, leverage ratio, net farm income and management income (Castle, Becker and Smith 1972).

A typical farm in Bangladesh consists of more than just field crops. Cattle and goats provide milk, meat, manure, draft power, hides and skins. Poultry and fish also provide nutritious food and cash income. The homestead area contributes to production of fruits, vebetables, timber and spices. It also provides space for scavenging of poultry birds, storing and processing of crops and crop by-products (Rahman et al. 1989). All these components of a

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farm are interlinked and they interact in a complex manner to constitute what may be called a farming system. Thus farming system can be defined as "the complex arrangement of soils, water sources, crops, livestock, labour and other resources and characteristics within an environmental setting that the farm family manages in accordance with the preferences, capabilities and available technologies" (Shaner, Philipp and Schmehl 19R2).

Most of the past research attempts in Bangladesh concentrated on analysis of individual enterprises, mainly crops. Thus the importance of other enterprises and the impacts of their mutual interaction on the whole farm business were missing in such analyses. In a system approach to farming, the given supply of fixed farm resources are allocated to a number of crop, livestock and other enterprises which are mutually interrelated and interdependent. In many cases it becomes unrealistic to apportion and allocate such fixed resources to individual enterprises. Thus return over variable cost (gross margin) is often die more appropriate criteria for judging the performance of individual enterprises and their contribution to the whole farm business. The sum of gross mar-in from individual enterprises would give the gross margin of the whole farm business. The farmer would then have the scope to check for return over the fixed resources along the line of "residual income measures", depending on the opportunity cost of the relevant fixed resources.

This study attempts to analyse the whole farm business, considering fv¯ms to be operating in the framework of farming system in a selected area of Bangladesh. Attempts are made to derive measures of performance of individual subsystems within each farming systems. The primary income measure is the "gross margin" of individual subsystems namely crop, livestock, poultry and fishery. The gross margin per Taka of variable cost would put the individual components/subsystems into amenable position for mutual comparison. The relative performance of the alternative farming systems are studied by comparing die whole-farm residual income measures such as "net farm income" and "management income",

II. DATA AND METHODOLOGY

Since the aim of the study was to examine the economic performance of the farm business under alternative farming systems, the purpose could be better served in an area where some farming systems were already identified. The Bangladesh Agricultural University, Mymensingh had an on-going research project entitled "Farming Systems Research and Development Programme" (FSRDP) in the Kazir Shimla village of Mymensingh district. In order to take advantage of the already identified farming systems, village Kazir Shimla was selected as the research site for the study.

Data were collected from the farm households falling in the selected farming systems. As many as 27 farming systems were identified by the FSRDP team in the Kazir Shimla area. A two stage sampling procedure was adopted in the study. In the first stage, four dominant systems were selected. These were Crop-Cattle-Goat-Poultry-Fish (C-C-G-P-F), Crop-CattlePoultry-Fish (C-C-P-F), Crop-Cattle-Poultry (C-GP) and Crop-Poultry-Fish (C-P-F) systems.

In the second stage, individual farmers were selected from each of the systems. Lists of farm households falling in each system were obtained from FSRDP office. The criteria chosen was to select at least 50 per cent of the farm households in each system as the sample for the study. The number of farms falling in C-C-G-P-F, C-C-P-F, C-C-P and C-P-F systems were 39, 41, 29 and 42 respectively. Thus the number of samples selected from the above systems were as follows:

Name of the system	Number of farms in the system	Number of farms selected as sample
C-C-G-P-F	39	20
C-C-P-F	41	21
C-C-P	29	15
C-P-F	42	21
All Systems	151	77

Data were collected for one year of operation begining from January to December 1992. This covered three rice crop seasons namely Boro, Aus and Aman, and a truncated picture of other farming operations for the year.

Specification and Derivation of Income Measures

The relative performance of different enterprises and that of the whole farm business were assessed in terms of the following income concepts:

Gross Output:

Gross output was calculated by multiplying the total volume of production of an enterprise by the farm gate price. For crop enterprise, it consisted of the values of main and by-products. For cattle, poultry and fish, gross output consisted of the values of main, by-products and net change in inventory. Net change in inventory was defined as: (closing stock + sold + consumed) - (opening stock + purchased).

Gross Margin:

Gross margin was derived by subtracting variable cost from the gross output. Sum of the gross margin of the individual enterprises represented gross margin for the whole farm business. For crop enterprises, gross margins were calculated per hectare of the crop enterprises in addition to gross margin for total hectarage of crops. For all enterprises, gross margins were calculated per Taka of variable cost in order to make them amenable for mutual comparison.

Net Farm Income:

Net farm income which represented return to the farm family for contribution of labour, capital and management, was calculated by subtracting the selected fixed cost items such as

cost of land use, payment for the annually hired labour and depreciation on farm buildings and equipments from sum of the gross margin for the whole farm business.

Management Income:

Management income represented the final residual income, and was calculated by subtracting the opportunity costs of family labour including that of the operator and operating capital from the net farm income.

III. ANALYSIS OF THE FARM BUSINESS OF THE SELECTED FARMING SYSTEMS

The performance of farm business has been analysed for four selected farming systems. A farming system, as has been mentioned, consisted of a number of subsystems. The maximum number of subsystems within a farming system were five in this study. These were Crop, Cattle, Goat, Poultry and Fish. Each susbsystem again, consisted of a number of enterprises. For example, the crop subsystem in this study consisted of the following crop enterprises: Boro paddy, Aus paddy, Aman paddy, wheat, potato, pulses, vegetables and fruits.

Costs and benefits were calculated in respect of all these enterprises. The results have been presented through standard income concepts. As mentioned, the income concepts used in this study were gross output, gross margin, net farm income and management income.

Gross Output and Gross Margin of the Crop Component.

Gross output of the crop enterprises consisted of the values of the main crop products and crop by-products. Gross margin was calculated by subtracting the variable costs associated with the enterprise from gross output of the respective enterprise. Gross margin was calculated for each crop enterprise in three forms: per farm, per hectare and per Taka of variable cost.

Gross margin of crop component of the C-C-G-P-F, C-C-P-F, C-C-P and C-P-F systems are presented in Tables 1, 2, 3, and 4 respectively. It appears that gross margins per hectare and per Taka of variable cost were highest for vegetables and fruits in all the systems. If we exclude vegetables and fruits from the crop component, the comparison would perhaps be more meaningful. Among the field crops, gross margin per hectare was the highest for Boro paddy in all the systems except that Aman paddy in the C-C-P-F system had the highest gross margin per hectare (Tk. 14,501). Besides, Aman paddy had the highest gross margin per Taka of variable cost among the cereal crops in all the systems. This might be attributed to involvement of lesser variable cost for variable cost for Aman production. Pulses had the highest gross margin per Taka of variable cost among all the field crops in the C-C-P-F (Tk. 2.46) and C-C-P (Tk. 2.36) systems.

Gross margin per farm of the total crop component was the highest for the C-C-P-F system (Tk. 26,104) although this system had the second highest operated area (0.87 hectares). This system also had the highest gross margin per Taka of variable cost of the total crop component (Tk. 1.80, Table 2). The highest operated area was for the C-C-G-P-F system (0.97 hectares) and the system had the second highest gross margin per farm of the crop component (Tk. 19,146).

Table 1. Gross Margin of Crop Component under Crop-Cattle-Goat-Popultry-Fish System.

Name of crop/product	Area (ha)	Gross Margin		
		per farm (Tk.)	per hectare (Tk.)	per Tk. var. cost
Boro paddy	0.2888	2923.00	10120.87	0.96
Aus paddy	0.4841	4045.95	8457.34	1.26
Aman paddy	0.8872	7700.90	8680.53	1.32
Wheat	0.1202	524.46	4278.47	0.53
Pulses	0.0641	230.92	3604.20	1.04
Potato	0.0209	68.08	874.42	0.13
Vegetables	0.0500	697.65	13969.77	1.93
Fruits*	0.1052	3014.50	-	13.73
Total	2.0205	19145.66	-	1.33
Total operated area**	0.9745	-	-	-
Gross margin per hectare of cropped area	-	9475.70	-	-
Gross margin per hectare of operated area	-	19646.65	-	-

Note: * Fruit area refers to homestead area
** Total operated area includes homestead area.

Table 2. Gross Margin of Crop Component under Crop-Cattle-Poultry-Fish System.

Name of crop/product	Area (ha)	Gross Margin		
		per farm (Tk.)	per hectare (Tk.)	per Tk. var. cost
Boro paddy	0.1880	2385.32	12690.86	1.08
Aus paddy	0.4704	4484.75	9532.88	1.19
Aman paddy	0.8788	14193.21	14500.72	2.27
Wheat	0.1071	104.95	979.67	0.11
Pulses	0.0962	765.24	7964.02	2.46
Potato	0.0440	142.65	3242.43	0.23
Vegetables	0.0284	929.76	32694.24	2.80
Fruits*	0.1545	3273.81	-	43.52
Total	2.0274	26103.69	-	1.80
Total operated area**	0.8706	-	-	-
Gross margin per hectare of cropped area	-	10753.77	-	-
Gross margin per hectare of operated area	-	29983.56	-	-

Note: * Fruit area refers to homestead area
** Total operated area includes homestead area.

Total 3. Gross Margin of Crop Component under Crop-Cattle-Poultry System

Name of crop/product	Area (ha)	Gross Margin		
		per farm (Tk.)	per hectare (Tk.)	per Tk. var. cost
Boro paddy	0.1294	1981.48	15309.97	1.39
Aus paddy	0.3180	3111.88	9942.89	1.15
Aman paddy	0.4894	4833.71	9876.70	1.40
Wheat	0.0751	611.26	8498.16	1.11
Pulses	0.0242	133.85	5542.42	2.36
Potato	0.0638	399.78	6266.65	0.55
Vegetables	0.0053	486.59	91351.69	15.66
Fruits*	0.1246	2863.98	-	21.48
Total	1.2298	14422.53	-	1.59
Total operated area**	0.4286	-	-	-
Gross margin per hectare of cropped area	-	7969.13	-	-
Gross margin per hectare of operated area	-	33650.33	-	-

Note : * Fruit area refers to homestead area
** Total operated area includes homestead area.

Table 4. Gross Margin of Crop Component under Crop-Poultry-Fish System.

Name of crop/product	Area (ha)	Gross Margin		
		per farm (Tk.)	per hectare (Tk.)	per Tk. var. cost
Boro paddy	0.1964	2199.07	11198.69	1.15
Aus paddy	0.2556	22500.17	9779.79	1.34
Aman paddy	0.5279	4720.58	8941.34	1.36
Wheat	0.0411	203.42	4954.22	0.68
Pulses	0.0303	61.85	2037.85	0.62
Potato	0.0241	54.76	91.51	0.16
Vegetables	0.0280	609.52	21772.41	2.78
Fruits*	0.1415	1951.43	-	7.97
Total	1.2449	12248.25	-	1.45
Total operated area**	0.5863	-	-	-
Gross margin per hectare of cropped area	-	9838.74	-	-
Gross margin per hectare of operated area	-	20890.76	-	-

Note: * Fruit area refers to homestead area
** Total operated area includes homestead area.

Table 5. Gross Margin per Farm of Cattle Component.

System	Income from cattle (Tk.)	Net change in inventory (Tk.)	Gross output (Tk.)	Variable cost (Tk.)	Gross margin per farm (Tk.)	Gross margin per Tk. of var. cost (Tk.)
C-C-G-P-F	4871.50	3224.50	8096.00	3975.20	4120.80	1.04
C-C-P-F	4703.48	1095.23	5798.71	3524.24	2274.47	0.65
C-C-P	5651.20	1673.32	7324.52	4045.20	3279.32	0.81

Table 6. Gross Margin per Farm of Poultry Component.

System	Income from cattle (Tk.)	Net change in inventory (Tk.)	Gross output (Tk.)	Variable cost (Tk.)	Gross margin per farm (Tk.)	Gross margin per Tk. of var. cost (Tk.)
C-C-G-P-F	856.25	114.75	971.00	630.35	340.65	0.54
C-C-P-F	722.62	148.75	871.37	589.71	281.66	0.48
C-C-P	800.20	32.12	832.32	358.15	474.17	1.32
C-P-F	639.10	70.72	709.82	211.62	498.20	2.35

Table 7. Gross Margin per Farm of Fish Component.

System	Gross output (Change in inventory) (Tk.)	Variable cost (Tk.)	Gorss margin per farm (Tk.)	Gross margin per Taka of variable cost (Tk.)
C-C-G-P-F	6271.65	730.90	5540.75	7.58
C-C-P-F	10030.43	511.80	9518.63	18.60
C-P-F	5549.63	412.47	5137.16	12.45

Although total operated area per farm of the C-C-P system was the lowest (0.43 hectares), its gross margin per farm of the crop component was higher (Tk. 14,422) than that of the C-P-

F system (Tk. 12,248) which had the operated area of 0.59 hectares. Gross margin per Tal:a of variable cost of the crop component of the C-C-P system was also higher (Tk. 1.59) than that for the C-P-F system (Tk. 1.45).

Gross Output and Gross Margin of the Cattle, Poultry and Fish Components

Gross outputs and gross margins of the cattle, poultry and fish components of different farming systems are presented in Tables 5, 6 and 7 respectively. As mentioned earlier, gross output of cattle component consisted of the value of the animal products and by-products sold, consumed and otherwise disposed of, and net change in inventory of the livestock animals. Table 5 reveals that both gross output and gross margin were highest for the C-C-G-P-F system. Gross margin per Taka of variable cost was also highest for this group of farms (Tk. 1.24). It may be mentioned that this system had goat in the cattle component and goat raising requires lesser variable cost. Thus goat raising might have contributed to the higher gross margin per farm and per Taka of variable cost for this group of farms. Gross margin of cattle per farm and per Taka of variable cost for the C-C-P farins were Tk. 3279 and Tk. 0.81 respectively and these were the second highest gross margins of the cattle component among the systems of farming.

Gross output of poultry also consisted of the value of poultry products sold, consumed and net change in the inventory of the poultry birds. Derivation of gross output and gross margin of poultry component for the selected farming systems is shown in Table 6. It appears that gross margins per farm and per Tal:a of variable cost were the highest for the C-P-F system (Tk. 498 and TI:. 2.35 respectively), although this group of farms had the lowest gross output per farm. Although gross output per farm was the highest for the C-C-G-P-F system (Tk. 971), total variable cost was also the highest for the group of farms and consequently gross margins per farm and per Talca of variable cost were the second lowest for this group of farms (Tk. 341 and 1k. 0.54 respectively). The lowest gross margins per farm and per Taka of variable cost were obtained by the C-C-P-F farms (Tk. 282 and Tk. 0.48 respectively).

The fish component did not have any separate fish product and as such gross output of the component represented only the net change in inventory of the fish resource. Derivation of gross output and gross margin for the fish component are presented in Table 7. Of all the components of the farm business, fish appeared to be the most profitable in terms of gross margin per Taka of variable cost for all the systems of farming. Gross margins per farm and per Taka of variable cost were the highest for the C-C-P-F system (Tk. 9519 and Tk. 18.60 respectively). Gross output per farm as also highest for this group of farms. Although gross margin per farm was the second highest for the C-C-G-P-F farms, total variable cost for die group of farms was the highest of all groups and consequently gross margin per Taka of variable cost was the lowest for this group of farms (T:. 7.58).

A summarized picture of gross output and gross margin per farm, and gross margin per Taka of variable cost for all the components and the farm business as a whole for all the systems of farming is persented in Appendix Table A-1.

Residual Income Measures of the Selected Farming Systems

So far the analyses have covered derivation and interpretation of gross margin for individual enterprises, components and the farm business as a whole for the selected farming systems. Gross margin analysis has limitations in that it can not depict the whole picture neither of individual enterprises nor of the whole farm business. It is a convenient technique of analysis in situations where some of the cost items especially the fixed ones can not be allocated to individual enterprises. Gross mar-in is only a short run decision making criterion. Whether or not a farm business is profitable in the long run will be determined by charging for the fixed inputs. The reality, however, is that many of the fixed farm resources have very low opportunity costs. This presents a dilemma as to the choice of the rate at which the fixed inputs will be charged.

In the present analysis, attempt is made to derive some selected measures of success of the whole farm business by considering the opportunity cost of the fixed resources equal to the market price for the services of the (similar) resources. The measures of performance of the alternative farming systems are analysed here in terms of the residual income measures such as "net farm income", "operator's labour and management income" and "management income". These income measures are derived for the C-C-G-P-F, C-C-P-F, C-C-P and C-P-F systems and the results are presented in Tables 8, 9, 10 and 11 respectively.

The residual income measures for the C-C-G-P-F system are presented in Table 8. As is evident, gross output and gross margin have been computed for the individual components of the whole farm business. The gross margins of Crop, Cattle, Goat, Poultry and Fish components are added horizontally to derive total gross margin of Tk. 28,948 for the whole system as appears from the last column of Table 8. The fixed costs included the costs of land use, annually hired worker, farm buildings and equipments. The total charge on account of the fixed cost items was Tk. 14,221 which is deducted from the total gross margin. The residual is the net farm income of Tk. 14,726 which is the return to the farm family for contribution of labour, operating capital and management to the farm business. The next item for deduction was the opportunity cost of family labour other than that of the operator. The average farms in the system had 342 mandays of such family labour which was charged at the market wage rate of Tk. 40. The residual is the operator's labour, capital and management income of Tk. 1046. A representative operator in this system spent an amount of Tk. 19968 as operating capital during the year of operation of the farm business. Interest on the average of this amount at the rate of 10 per cent represented the opportunity cost of this money which was Tk. 998. Having deducted this cost, the residual was the operator's labour and management income of Tk. 48 only. A typical operator of this system contributed 216 mandays of personal labour to the farm business. If the operator's labour contribution is charged at the market wage rate of Tk. 40 and the amount is deducted from the operator's labour and management income, the final residual is the negative management income of Tk. 8,602 (Table 8).

Table 8. Business Analusis of Crop-Cattle-Goat-Poultry-Fish Farming System.

Items		Income/Expenditure per farm (Tk.)				
		Crop	Cattle and Goat	Poultry	Fish	Total
A.	**Gross Output**	33576.86	8096.00	971.00	6271.65	48915.51
B.	**Variable Costs**	14431.20	3975.29	830.35	730.90	19967.65
C.	**Gross Margin**	19145.66	4120.80	140.65	5540.75	28947.86
D.	**Fixed Costs:**					
	Land use	0.9745	hectare @	Tk. 7600	7406.20	
	Annually hired labour	147.50	mandays @	Tk. 40	5900.00	
	Farm building & equipment	Depreciation			915.39	
	Total Fixed Costs					14221.59
E.	**Net Farm Income**					14726.27
F.	**Opportunity costs of family labour other than that of the operator**	342 mandays @ Tk. 40				13680.00
G.	**(E-F): Operator's Labour, Capital and Management Income**					1046.27
H.	**Opportunity cost of working capital**	Tk. 19967.65 @ 10%				998.38
I.	**(G-H): Operator's Labour and Management Income**					47.89
J.	**Opportunity cost of operators labour**	216.25 Mandays @ Tk. 40				8650.00
K.	**(I-J): Management Income**					- 8602.11

Table 9. Business Analysis of Crop-Cattle-Poultry-Fish Farming System.

Items	Income/Expenditure per farm (Tk.)				
	Crop	Cattle and Goat	Poultry	Fish	Total
A. Gross Output	40618.10	5798.71	871.37	10030.43	57318.61
B. Variable Costs	14514.41	3524.24	789.71	511.80	19340.16
C. Gross Margin	26103.69	2274.47	81.66	9518.63	37978.45
D. Fixed Costs:					
Land use	0.08706	hectare	@ Tk. 7600	6616.56	
Annually hired labour	147.62	mandays	@ Tk. 40	5904.80	
Farm building & equipment	Depreciation			565.42	
Total Fixed Costs					13086.78
E. Net Farm Income					24891.67
F. Opportunity costs of family labour other than that of the operator	363.34 mandays @ Tk. 40				14533.60
G. (E-F): Operator's Labour, Capital and Management Income					10358.07
H. Opportunity cost of working capital	Tk. 19340.16 @ 10%				967.01
I. (G-H): Operator's Labour and Management Income					9391.06
J. Opportunity cost of operators labour	216.25 Mandays @ Tk. 40				8352.40
K. (I-J): Management Income					1038.66

Table 10. Business Analysis of Crop-Cattle-Poultry Farming System.

Items	Income/Expenditure per farm (Tk.)			
	Crop	Cattle	Poultry	Total
A. Gross Output	23482.04	7324.52	832.32	31638.88
B. Variable Costs	9059.51	4045.20	358.15	13462.86
C. Gross Margin	14422.53	3279.32	474.17	18176.02
D. Fixed Costs:				
Land use	0.4286 hectare @ Tk. 7600		3257.36	
Annually hired labour			- - -	
Farm building & equipment	Depreciation		551.44	
Total Fixed Costs				3808.80
E. Net Farm Income				14367.22
F. Opportunity costs of family labour other than that of the operator	298 mandays @ Tk. 40			11920.00
G. (E-F): Operator's Labour, Capital and Management Income				2447.22
H. Opportunity cost of working capital	Tk. 19340.16 @ 10%			673.14
I. (G-H): Operator's Labour and Management Income				1774.08
J. Opportunity cost of operators labour	210.67 Mandays @ Tk. 40 (210 x 40)			8426.80
K. (I-J): Management Income				-6652.72

Table 11. Business Analysis of Crops-Poultry-Fish Farming System.

Items	Income/Expenditure per farm (Tk.)			
	Crop	Poultry	Fish	Total
A. Gross Output	20684.76	709.82	5549.63	26944.24
B. Variable Costs	8436.54	211.62	412.47	9060.63
C. Gross Margin	12248.25	498.20	5137.16	17883.61
D. Fixed Costs:				
Land use	0.5863 hectare @ Tk. 7600		4455.88	
Annually hired labour			-	
Farm building & equipment	Depreciation		279.42	
Total Fixed Costs				4735.30
E. Net Farm Income				13148.31
F. Opportunity costs of family labour other than that of the operator	230 mandays @ Tk. 40			9200.00
G. (E-F): Operator's Labour, Capital and Management income				3948.31
H. Opportunity cost of working capital	Tk. 9060.63 @ 10%			453.03
I. (G-H): Operator's Labour and Management Income				3495.28
J. Opportunity cost of operators labour	210.67 mandays @ Tk. 40			7714.40
K. (I-J): Management Income				- 4219.12

The above income measures are also derived for the C-C-P-F, C-C-P and C-P-F systems and presented in Tables 9, 10 and 11 respectively. It appears that the C-C-P-F system had almost similar crop acreage and other fixed resource structure to those of C-C-G-P-F system. However, this system had relatively higher gross output and gross margin from crop and fish components which contributed substantially to the higher gross margin of the whole farm

business (Tk. 37,978). The charges for the fixed cost items for this system being almost similar to those of the C-C-G-P-F system, this system earned a positive management income of Tk. 1,039 (Table 9). Thus it is only the C-C-P-F system which earned a positive management income among all the selected systems of farming.

The characteristic features of the other two systems: C-C-P and C-P-F were somewhat different from those of the above explained two systems in that none of these systems (C-C-P and C-P-F) had any annually hired worker. Their operated area and other fixed resources were also relatively lower. The whole farm gross margins for the C-C-P and C-P-F systems were Tk. 18.176 and Tk. 17,884 respectively. Having not to pay for any annually hired labour and because of lesser charges for cost of land use and depreciation charges, total fixed costs for these systems were sufficiently lower. However, both these systems had mandays of operator's labour almost similar to those of the other two systems. These mandays were charged at the market wage rate. Consequently, the residual management income for these two systems were negative and were Tk. 6,653 (Table 10) and Tk. 4,219 (Table 11) respectively. A summarised picture of the residual income positions for all the four farming systems is presented in Appendix Table A-2.

IV. CONCLUSIONS

The relative performance of the alternative farming systems was assessed using residual income measures namely "gross margin", "net farm income" and "management income". The analysis of gross margin revealed that gross margin per Taka of variable cost varied sufficiently among different enterprises and components within a farming system and also between farming systems. Within the crop component, vegetables and fruits gave higher gross margin per Taka of variable cost. The between component comparison revealed that gross margin per Taka of variable cost was the highest for the fish component for all the systems of farming. Thus farmers can take advantage of expanding these enterprises/components for maximising returns from the whole farm business.

The analysis of the whole farm income measures for the alternative farming systems revealed that except for the C-C-P-F system, none of the farming systems earned any positive return to management. All the systems, however, earned positive "operator's labour and management income". The nagative management income is not very unexpected in a situation like Bangladesh where many of the family fixed resources have very low opportunity costs. It should also be recognized that management is an intangible part of production and is inseparable from the manager or operator. It is very difficult to isolate operator's contribution as manager from that as a labourer. Hence a separate return to management is often inconcieveable particularly in the peasant farming situation of Bangladesh. Thus farmers, left to choose, may be content with whatever positive return they earn to their composite input "labour and management".

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Table A-1. Summary Gross Margin of Alternative Farming System.

Items	Income/Expenditure per farm (Tk.)				
	Crops	Cattle and Goat	Poultry	Fish	All
		C-C-G-P-F			
Gross Output	33576.86	8096.00	971.00	6271.65	48915.00
Variable Cost	14431.20	3975.20	630.35	730.90	19967.65
Gross Margin	19145.66	4120.80	340.65	5540.75	28947.86
Gross Margin per Taka of Var. cost	1.33	1.04	0.54	7.58	1.45
		C-C-P-F			
Gross Output	40618.10	5798.71	871.37	10030.43	57318.61
Variable Cost	14514.41	3524.24	589.71	511.80	19340.16
Gross Margin	26103.69	2274.47	281.66	9518.63	37978.45
Gross Margin per Taka of Var. cost	1.80	0.65	0.48	18.60	1.96
		C-C-P			
Gross Output	23482.04	4324.52	832.32	-	31638.88
Variable Cost	9059.52	4045.20	358.15	-	13462.86
Gross Margin	14422.53	3279.32	474.17	-	18176.02
Gross Margin per Taka of Var. cost	1.59	0.81	1.32	-	1.35
		C-P-F			
Gross Output	20684.79	-	709.82	5549.63	26944.24
Variable Cost	8436.54	-	211.62	412.47	9060.63
Gross Margin	12248.25	-	498.20	5137.16	17883.61
Gross Margin per Taka of Var. cost	1.45	-	2.35	12.45	1.97

Table A-2. Business Analysis of Alternative Farming Systems.

Items	Income/Expenditure per farm (Tk.)			
	C-C-G-P-F	C-C-P-F	C-C-P	C-P-F
A. Gross Output	48915.51	57318.61	31638.88	26944.24
B. Gross Margin	28947.86	37978.45	18176.02	17883.61
C. Fixed Costs	14221.59	13086.78	3808.80	4735.30
D. Net Farm Income	14726.27	24891.67	14367.22	13148.31
E. Opportunity cost of family labour other than that of the operator	13680.00	14533.60	11920.00	9200.00
F. (D-E): Operator's Labour, Capital & Management Income	1046.27	10358.07	2447.27	3948.31
G. Opportunity cost of working capital	998.38	967.01	673.14	453.03
H. (F-G): Oprator's Labour and Management Income	47.89	9391.06	1774.08	3495.28
I. Opportunity cost of operator's labour	8650.00	8352.40	8426.80	7714.40
J. (H-I): Management Income	-8602.11	1038.66	-6652.72	-4219.12