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FARM PLANNING—A TECHNIQUE FOR BETTER FARM MANAGEMENT AND BETTER FAMILY LIVING*

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This paper presents the results of a research project undertaken to determine the applicability and usefulness of farm planning for better farm organisation in the area lying close to the Allahabad Agricultural Institute. In this study an attempt was made at total budgeting with two limiting resources—land and animal units. The steps involved in farm planning consisted of the following.

Appraisal of Resources and Markets

Appraisal of land, human and bullock labour, buildings, equipment, current operating capital, etc., which were available for use on the farm, was first studied. It was accepted that it would be much too costly to make changes in the total amount of landholding and animal units (by increasing these), and thus these were taken to be fixed in nature within the framework of the present study. It was then a process of maximising the production per unit of these limiting resources. Labour supply was particularly appraised having observed almost total use of family labour on the farm. The region in which the study was made suffered from one draw-back. The existence of an industrial establishment within the periphery of the village from which the farms were selected attracted a large number of farmers to earn off-and non-farm income at this site as and when hired labour was required by the establishment. Most of the farmers therefore were reluctant to spend any additional time on the farm operations as suggested under the improved plan, unless they could see through the obvious advantages of utilising their time and labour on-farm as against those of off-farm. The increase in the number of man-days under the alternate plan is, thus, rather small. There was here an obvious advantage in increasing the number of animal-units, particularly of milch-animals, but the investment was too heavy with reference to somewhat slower returns to capital invested; once again, the problem of providing additional labour units required to take care of the increased number of animal units cropped up.

An appraisal of capital resources involved the assessment of building, livestock, equipment, cash, and other liquid assets which would be converted into productive capital of one kind or the other. The managerial ability of the farm operator was assessed from the viewpoint of both efficiency as well as capacity. It must be recognised, however, that it is difficult to do so objectively on most farms.

Markets in the area were considered as determinants of type of farming activities, what needed to be produced and how much of it, as well as sources of farm equipment and farm supplies. Profitable production beyond the needs of the agricultural household depends greatly on the markets for given commodities which the farmer produces. Accurate forecasts of prices require a knowledge and consideration of many issues, particularly the price-elasticity of demand for products having a considerable marketable surplus.

* This paper is prepared from the data obtained for research project no. RE 106, Allahabad Agricultural Institute, Allahabad, U.P.

Land-Use Programme

The discovery of crops and crop-rotations as the "highest-profit" enterprises was considered essential in the land-use programme. The gross annual profit year after year was used for selection of enterprises and their proper combination. It was here that the Principle of Opportunity Cost was studied seriously with reference to each farm-situation. Crop-rotations were evaluated on the basis of the average annual returns to fixed factors and of yields of principal crops. It was then that the available land was put under the "higher-profit" crops, as far as was possible. The needs of certain crops produced primarily for home consumption were considered to be very important in farm planning.

Budgeting of Men and Bullock Labour Requirements

The main consideration here was adequate supply and fuller utilisation of human and bullock labour under the alternate plans. An elementary "Calendar of operations" was prepared to estimate total labour requirements by 15-day periods and compared with similar estimates of the available supplies. A reference has already been made previously on the labour supply situation. On the bullock power utilisation, better results were obtained even though it pushed up the expenditure incurred on feeds considerably.

Budgeting of Equipment Requirements

A careful check on the adequacy of equipment to ensure effective and timely execution of farm operations revealed that these were sufficient to take care of the given increases in the scope of farming operations of most farms under study. The commonest piece of equipment was the *desi* plough with an average value of Rs. 6 for its ownership. Most of the other items of equipment cost less than this amount. The average investment in equipment of all kind to the total investment in fixed resources came to about three per cent.

Planning for Financing, Estimation of Inputs, Outputs and Earnings

The means of financing the new investments under the plan and additional current expenditure were next considered. These are intimately linked up to the plans for marketing farm produce and estimation of inputs, returns, and earnings. Use of co-operative credit was advocated for short and medium-term credit. Self-supporting financial plans for long-term credit were suggested.

Specific plans for marketing of the farm produce as an important means of increasing income were studied, discussed with the participants, and recommendations made. This involved the mode of transportation and use of various market outlets for the products included under the alternate plans.

The success of the plan is generally indicated by the final estimates of inputs, returns and earnings. The inputs or expenses included, and the measure of returns employed for comparisons, were related to the resources owned or supplied by the farm operator and for which, the returns were maximised.

The selection of prices and costs used in the alternate plans required careful discrimination. Ordinarily, such data are based on prices which are current, but they ought to reflect the best estimates of the price levels prevailing at the time when the plan is in operation. In the present study, most conservative estimates were made with regard to prices and returns so as not to be too optimistic about the success of alternate plans. A number of alternate plans were formulated and discussed on the farm, some of these to be later rejected, and others to be modified on the ground that incomes were likely to be more uncertain; personal preferences for production of certain enterprises also played an important part in their inclusion, rejection, and modification, in the alternate plans. The most frequent guiding principle was the fact that funds for financing the plan were not always readily available on favourable terms as was generally expected and that the operator and his family did not care to work as hard as the given plan required.

The following results are presented, recognising the fact that the accuracy of farm planning depends largely on the quality and quantity of basic input-output data available to serve as material with which to work. It is understood that better basic data would render better farm planning procedures.

TABLE I—VALUE OF INVESTMENT IN FARM RESOURCES

Farm No.	Total bighas of land operated	Total value of land (Rs)	Man-Equivalent	Other Capital (Rs)	Total Investment (Rs)	Average value of land per bigha (Rs)	Average Investment per bigha (Rs)
1.	20.00	8,000	2.00	4,338	12,338	400	617
2.	17.00	4,700	2.40	1,994	6,694	276	394
3.	18.00	5,500	2.50	1,681	7,181	306	399
4.	6.00	1,900	1.80	771	2,671	317	445
5.	12.25	4,000	2.20	1,970	5,970	326	487
6.	10.50	2,400	2.40	1,105	3,505	228	334
Average	13.96	4,417	2.20	1,976	6,393	309	446

In the present study, selection of farms was based mostly on the size of holdings. The variation was from 'small size' (6 *bighas*) to 'large size' (20 *bighas*) for the area under study, which helped to study the effects of changes in returns with size of holding. One of the plausible methods of assessing soil productivity is to estimate the total value of land and value per *bigha* over a period of time. While this method would give some indication of relative productive potential of land, the investigator's estimates are not always very accurate; in the present study these estimates, however, were made by the author after personal inspection of each field, and after the farmer's own estimates. The man-equivalent was obtained by converting the

labour of men, women and children, actually available for farm work, into man-days and then equating 300 man-days to be one man-equivalent. There was not much variation and men-equivalents were not necessarily related to the size of holdings, the farms being family farms rather than commercial operating units, with reference to labour-use.

'Other capital' included fixed and operating capital besides land and labour. This too did not have any relationship to the size of farm and varied considerably. Average investment per *bigha* has a decisive influence on the total earning capacity of a farm, as observed later in this study. The number of family members actually working on the farm varied from three to nine with variation in ages from less than six years to more than 80. Average number of fragments was thirteen and average distance from house to the fields was almost one mile.

TABLE II—MANAGEMENT PRACTICES

Farm No.	Bighas under Crops to be Totally or Partially Sold		Bighas under Crops Produced Solely for Home Consumption		Manure, including Green Manure, Used (in maunds)		Seed Used (in maunds)	
	Present Plan	Alternate Plan	Present Plan	Alternate Plan	Present Plan	Alternate Plan	Present Plan	Alternate Plan
1.	3.0	14.5	15.0	3.5	—	858	12	16
2.	9.5	13.0	4.5	2.5	—	630	14	17
3.	6.5	14.0	7.5	4.0	—	430	10	18
4.	—	5.0	5.8	0.8	—	115	2	3
5.	4.0	10.0	8.0	2.0	200	354	8	8
6.	3.0	7.5	7.0	2.5	15	252	4	5
Average	5.2	10.7	8.0	2.6	108	440	8	11

The area under crops to be sold—either totally or partially was increased in the alternate plan, particularly because of better soil-fertility lands on some farms, and availability of water (three wells) on farm number 1, on which potato crop was introduced in the selection of enterprises for greater farm income. *Bighas* sown under crops to be sold consisted mostly of crops grown singly on each plot even though 2 and 3-crop mixtures were also put under the category from which crops were to be sold partially depending on the quality and quantity of crops produced. Area under crops to be sold was doubled under the alternate plan, having exploited the market potential for such crops. These crops were, mainly, rice, peas, wheat and onion, grown singly in most cases. Mixed crops which were also planned to be sold were gram, linseed, mustard and potato.

Bighas under crops produced solely for home consumption consisted mostly of mixtures. There was a large number of mixtures grown—with as many as

fifteen different combinations—and yields of such mixed crops were generally much below the average expected yields in this type of farming area. Land under mixed crops was generally allocated in the absence of incentive and enterprise on the part of the farmer for production of crops with good sale value. Under the alternate plan, such land was used for production of cash-crops, with liberal applications of farmyard manure and green manuring crops. Thus, by bringing better land under cash crops, area under crops grown solely for home consumption was reduced by more than 200 per cent over the present plan. Foodgrains for home use now came from the limited area under this category, and from area under crops to be partially sold.

Only two farms used manure and that too in very restricted quantities. In the alternate plan, definite attempts were made to encourage use of farmyard manure as well as production of green manure crops. The effects of green manuring crops were roughly estimated in terms of effects of farmyard manure. In the proposed plan, use of manure was increased more than 300 per cent over the present plan.

Seed-rate on most of the farms was just a little less required. Improved seeds were not generally used due to ignorance and lack of complementary supplies of water, manure and improved tillage implements required to obtain full advantage from such a practice. In the alternate plan, the seed-rate was increased by about 40 per cent.

TABLE III—VALUE OF FARM PRODUCTION

(In Rupees)

Farm No.	Crops		Livestock Products		Farm Products Consumed at Home		Total Value of Farm Production	
	Sold	To Be Sold	Present Plan	Alternate Plan	Present Plan	Alternate Plan	Present Plan	Alternate Plan
	Present Plan	Alternate Plan	Present Plan	Alternate Plan	Present Plan	Alternate Plan	Present Plan	Alternate Plan
1.	84.00	1,700	775.50	1,076	767	1,136	1,626.50	3,912
2.	266.50	838	440.00	760	648	922	1,354.50	2,520
3.	100.00	610	334.60	592	742	1,200	1,176.60	2,402
4.	78.00	494	268.25	480	484	670	830.25	1,644
5.	144.00	786	577.14	948	653	819	1,374.1	2,553
6.	249.00	491	139.47	686	796	1,012	1,184.47	2,189
Average	153.58	820	422.50	757	682	960	1,257.74	2,537

The effects of reorganisation were evident by the increase in the estimated value of crops to be sold after the alternate plan came into operation, which shows an average increase of 434 per cent; this was because considerable emphasis was laid on exploitation of market, with all-weather roads and better prices, which is well-developed in the area due to the presence of the industrial establishment. Not

much encouragement was given to increase in the volume of farm production consumed at home which was found to be adequate; but emphasis was on the quality of foodgrains and other items included in the diet which increased the value of farm products consumed at home by more than 40 per cent in the alternate plan. Increase in the value of livestock products was low (80 per cent). Comparatively less increase in the value of livestock products was primarily due to no increase in the animal units under the proposed plan. Here once again farmers preferred to keep the livestock mostly for farm work and for livestock products limited to home consumption, even though sale of *ghee* and *khoa* was contemplated in the improved plan. It is admitted that the low livestock production is a weak link in the present planning.

The size of farm number 6 was comparatively too small to show advantages of better planning due to fuller and better utilisation of farm resources. It will be observed, however, that in spite of, or perhaps because of, its small size, farm number 6 is a capital-intensive farm.

On the average, the estimated value of total farm production doubled under the proposed plan.

TABLE IV—ADDITIONAL CASH COSTS ON ALTERNATE PLANS

Farm No.	Added Investment	Interest on Added Investment at 5 per cent	Depreciation on Added Investment	(in Rupees)	
				Added Current Operating Expenses	Total Added Costs
1.	369	18.45	42	464	833
2.	93	4.65	8	164	257
3.	75	3.75	10	244	319
4.	45	2.25	4	105	150
5.	58	2.90	8	208	266
6.	Nil	Nil	Nil	127	127
Average	128	6.40	14	219	325

When considering additional cost for additional profits, the planner has to take cognizance of many factors, particularly those related to capacity of the farmer to obtain and repay credit involved in better production, the productive potential of the farm and the volume of capital investment. The marginal costs are actually more important here than total and fixed costs. These costs of increased production are also important in determination of how far to proceed along the planning procedure. At this stage diminishing marginal returns are not very important and the author has worked so far as the added costs were lesser than the added returns.

In the present study, added costs were divided into: added investment, interest on added investment, depreciation, and added current operating expenses. The greatest of these added costs were on farm number 1, where potato crop was introduced. Here the marginal returns are not very high as in other cases because of a larger volume of added investment on which income can be expected only over a period of time, as contrasted to added returns on added current operating capital on which rupee per rupee returns can be expected. The depreciation on added investment has been variable depending on the value and type of item included. On farm number 6, which is already capital-intensive, no further capital investment was deemed necessary. The average added investment was about Rs. 128, depreciation being less than Rs. 15 and interest Rs. 6.40, on the average. Average added current operating expenses were over Rs. 200 with total added cost coming to an average of Rs. 325. Compare these added costs to added returns as given in Table V, which works out at 1:4 ratio for added costs to added returns. Values of farm production under the present plan and the alternate plan are presented in Table V.

TABLE V—FARM PRODUCTION VALUE UNDER PRESENT AND ALTERNATE PLANS

Farm No.	Present Plan (Rs.)	Alternate Plan (Rs.)	Change (+) or (-) (Rs.)	Per cent Increase or Decrease Over Present Plan
1.	1,626.50	3,912	+2,285.50	+140
2.	1,353.50	2,520	+1,165.50	+86
3.	1,176.60	2,402	+1,225.40	+104
4.	830.25	1,644	+813.75	+98
5.	1,374.14	2,553	+1,178.86	+86
6.	1,184.47	2,189	+1,004.53	+85
Average	1,257.74	2,537	+1,279.26	+102

The total farm production value is made up of value of crop and livestock products sold and consumed at home, and farm products to be sold. Average production value under the present plan was about Rs. 1,258 whereas the estimated value of farm production under the alternate plan comes to Rs. 2,537 or, more than doubled. This has been made up partly by the increased value of farm products on farm number 1.

Rise in value of total farm production was due more to increased crop production rather than the livestock production in the alternate plan. This increase also goes to show that it is quite difficult to grow two blades of grass where only one grew before—particularly with depleted soils and inefficient human and bullock power utilisation.

The increase in production values varied from 85 per cent to 140 per cent, over the present plan. The average increased value of farm production per *bigha* was more than Rs. 90 whereas the average added costs under the alternate plan comes to about Rs. 23 per *bigha*.

TABLE VI—RETURNS TO LABOUR UTILIZATION

Farm No.	(In Rupees)			
	Man-days Used		Return per day of Labour	
	Present Plan	Alternate Plan	Present Plan	Alternate Plan
1.	607	714	2.68	5.48
2.	738	875	1.83	2.74
3.	788	860	1.49	2.79
4.	545	605	1.52	2.72
5.	690	735	1.99	3.47
6.	735	815	1.61	2.68
Average	684	767	1.85	3.31

Labour available on most farms was found to be quite adequate. As is commonly known, during the peak period additional labour is also hired which goes to increase the total cost of production. Under the alternate plans, attempts were made to eliminate the peak period bottle-necks in the labour requirements by prudent selection and combination of enterprises, by staggering the times of planting and harvesting and by the use of early and late varieties of crops, whenever this was possible. Man-days available on the farm for work were thus increased without additional increase in cost of using labour on hire. This increase was, however, negligible (12 per cent), primarily because the farm workers were not willing to spend more time on the farm operations due to more profitable non-farm employment available nearby. It must be mentioned here that in the present study, only farm incomes and farm expenses, and other farm activities were taken into consideration. It is quite possible, then, that those farmers having lower production units or decreased returns per *bigha* were actually having a better standard of living than those having better agricultural production. Such part-time farmers were not the concern of the present farm management study because such farmers were considered to be partly non-farmers and inclusion of off-farm incomes would have upset all calculations of the alternate plans as well as recommendations made for improvement. This was essential because in the study each farm was considered to be a single and entire unit from which incomes are obtained for business and family living expenses.

One of the methods used by farm management research worker for measuring labour efficiency and combination of enterprises on a farm, is to calculate returns per day of labour for an enterprise as well as for the entire farm. There are many factors responsible for higher return per day of labour but perhaps the most important of these is the increase in the value of farm production. Such a measure does not have much value where an absence of substantial marketable surplus occurs and the need for labour is not competitive. The return per day of labour, in the present study, under the alternate plan increased by nearly 80 per cent. But then, comparatively, the value of farm production has increased by 102 per cent in the proposed plan. Thus, admittedly, there is an excess of labour here which is holding back the returns per day of labour. This phenomenon may explain, partly, the reasons for financially backward farming communities.

When considering the use of labour for obtaining maximum benefit, one must recognise the seasonality of most agricultural operations which does not permit the year-round total employment of labour. Notice that such problem does not arise in cases where labour is hired for work and thus total day's work is obtained for a day of hire. Excess of labour — family labour — is also responsible for under-employment. The much talked about 'Calendar of operations' also begins to show its limitations here in the face of problems of poor soil fertility, dearth of good feeds and supply materials, prohibitive prices of fertilizers and improved implements, poor quality of operations executed by men and animals, inadequacy of irrigation water, including production of poor quality crops produced primarily for home consumption.

No addition to the existing number of animal units in the alternate plan was made because on most farms these animal units were sufficiently present. The emphasis in the proposed plans was not on the quantity but on the quality of the number of livestock already owned by the farmer. In one or two cases, reduction was suggested in the number of livestock but disposal was a problem (*e.g.*, on farm 1, having 2 camels and one horse).

Amount of feed used in the alternate plan was increased by about 48 per cent on the average. For maintenance, paddy fodder (*pual* or *piyars*) is fed and for work-ration, inclusion of oil-cakes and in the kharif season *chari*, is universal. In the alternate plan, use of green fodder and silage, where such facilities were possible, was advocated. In some instances, where milk production was to be enhanced, grains also were included in the animal feed. Average value of feed per animal-unit increased by about 48 per cent. This has a reference to the increase in the value of livestock products which increased by 80 per cent in the proposed plan. The effect was primarily affected by the better feeding programme for the work-stock rather than for the milch animals. Farmers were willing to feed more or better feeds to the work-animals but not the animals producing milk, which they said they would feed with refuse and other by-products from crop production. This may be due to their insistence on not selling milk and milk-products — or at least not reporting any such sales — but consuming livestock products at home. There is however, a market potential for fluid milk in this area because of the resident industrial population on the village outskirts and Allahabad city market. Even when this was suggested, the response for increasing production of milk and milk production was not encouraging. This particular phase of planning does need further study.

Farm planning technique is useful as a bench-mark for measuring progress and achievements on farms. In farm planning, the important feature is that the farm is considered as a single, operating unit, which is a very fundamental concept for farms of all countries. It helps a great deal in eliminating the problem of working out joint-costs, while taking into consideration the inter-relationship of competitive, complementary, and supplementary enterprises. Farm planning is a subjective procedure for making recommendation which actually is more of an advantage than a disadvantage, as is seen in the present study. The major problem in farm planning lies in accurately estimating price-cost relationships, which otherwise can completely upset the entire process involved in planning. Input-output relationships must also be studied carefully, because these too can be easily miscalculated. But then, this is the risk with which farm planning personnel must work. Success depends on accurate estimations, all through the length of the procedure.

In the present study, the managerial capacity and the technological changes affecting farm business have been assumed to remain unchanged over the period of planning. This is because the alternate plan, in the farm planning project under discussion, involves only one year of farm reorganisation. But when the farm planning is worked out for a longer period, these two factors must necessarily be considered as variables, and given due importance and weight in estimating cost-return relationships.