

FARM BUDGETS

A budget may be defined as a plan for spendings and earnings for a given period of time, which is usually one year. The success of budgeting is in fact an attempt at preparation of a detailed statement of the plan in quantitative terms. Basically, there are three types of farm budgets: i) Partial budget; ii) Enterprise budget; and iii) complete budget or whole farm budget. These are briefly discussed in the following sections of this chapter.

PARTIAL BUDGET

A partial budget refers to estimating profitability of small changes in an existing organization of a farm. It is a marginal analysis and shows the effect on net income resulting from the proposed change. Use of a partial budget is appropriate for making relatively minor adjustments in factor substitution and or product substitution. In factor substitution, one factor is substituted for another, e.g., changing from the conventional practice of manual wheat harvesting to machine cutting, plowing the land with tractor instead of bullocks, mechanical weeding instead of hand weeding, feeding of milch animals with cattle feed instead of cotton seed cake, etc. In product substitution, one product is substituted for another, e.g., wheat for gram, rice for cotton, maize for soghum, goat for sheep, buffalo for cow, etc.

The partial budgeting procedure consists of adding, subtracting or altering a part of the farm business to decide whether the change would be economically feasible. Only costs or returns resulting from the change are considered.

In preparing a partial budget, four items are taken into account. Two items relate to financial losses that are: 1) the new costs and 2) the revenue foregone; while the other two are concerned with financial gains which are (3) costs saved and (4) new revenue generated. The difference between losses (1+2) and gains (3+4) shows whether the proposed change is acceptable or not.

If the financial gains are more than financial losses, then the proposed change will increase the net income and will be attractive. If the financial gains are less than the financial losses, then the proposed change will decrease the net income and will not be desirable.

Assume a farmer has been feeding cotton seed cake to his milking animals besides the fodders grown on the farm. He has learnt that a new feed has been developed by a private manufacturing firm and this feed is being recommended for the dairy animals by the extension wing of the Department of Agriculture. The dairyman has to make a decision regarding a possible change over to the new feed. In this regard the detailed computations are given below:

1. Milk yield per animal per lactation with conventional cotton seed cake along with other farm produced fodders = 1890 kgs

2.	Milk yield per animal per lactation with new cattle feed along with the other farm produced fodders	= 1957.50 kgs
3.	Price of milk	= Rs.5/kg
4.	Price of cotton seed cake	= Rs.4.50/kg
5.	Price of new cattle feed	= Rs.3.50/kg
6.	Total quantity of cotton seed cake fed per lactation	= 1080 kg
7.	Total quantity of cattle feed fed per lactation	= 945 kg
8.	Labour cost of feeding one kg of feed	= Rs.0.25
9.	Labour cost of milking one kg of milk	= Rs.0.75

Table 6.1 Partial budget for substituting cotton seed cake with cattle feed.

Financial Losses		Financial gains	
1.	New Costs	3.	Costs Saved
a)	Cost of cattle feed: $945 \times 3.50 = \text{Rs.}3307.50$	a)	Cost of cotton seed cake: $1080 \times 4.50 = \text{Rs.}4860.00$
b)	Labour cost of feeding cattle feed: $945 \times 0.25 = 236.25$	b)	Labour cost of feeding cotton seed cake: $1080 \times 0.25 = \text{Rs.}270.00$
c)	Labour cost of milking $1957 \times 0.75 = \text{RS.}1467.75$	c)	Labour cost of milking while feeding cattle feed: feeding cattle seed cake; $1890 \times 0.75 = \text{Rs.}270.00$
d)	Sub Total (a+b+c)Rs.5011.5		Sub Total (a+b+c)Rs.6547.50

2.	Revenue foregone	4.	New Revenue.
e)	Value of milk produced while feeding cotton seed cake 1890X5 = Rs.9450.00		Value of milk produced while feeding cattle feed: 1957.50X5 = Rs.9787.50
Total cost (1+2) = Rs.14461.5		Total Gains (3+4)= Rs.16335.00	
Change in net income (Total cost - total gains)		16335-14461.50	
=		Rs.1873.12	

Decision: substitute cotton seed cake with cattle feed.

The Enterprise Budget

The enterprise budget is concerned with the analysis of individual crop or livestock activities in the farm plan. These are used to judge the profitability of alternative enterprises, and also to compare the profitability of existing and proposed enterprises. Various types of data are required for budgeting an enterprise, i.e., inputs used, yield per acre or per animal, and prices of inputs and outputs.

In estimating the returns from an agricultural enterprise or a production system, an important distinction is drawn between variable and fixed cost. The variable costs are those costs which are specific to an enterprise and vary with the scale of operation. Another way of appreciating the significance of this definition is that the variable costs should completely be attributable to the presence of an enterprise on the farm. For instance, in the production of milk, cost items such as fodder, concentrates, etc., make up variable costs since they are paid only if the milk is produced. Normally, variable costs increase with the intensity of inputs for a particular enterprise.

The fixed costs, on the other hand, are those cost items which can not be assigned directly to the operation of an enterprise; that is, they must be defrayed whether a particular enterprise is operated or not for the current production cycle. Fixed costs do not vary with the size or intensity of a particular enterprise. For milk production, such items are interest on shed and space, and depreciation on shed and some family labor. On a farm where several enterprises are in operation, it is very difficult to allocate fixed costs among enterprises.

The market value of the produce and or of any by-product of a production system is defined as its output: Normally this value is based on prices at the farm (village prices adjusted for local transport costs). When the variable costs are subtracted from the estimate of the output, the remainder is called the gross margin. This difference between the output and the variable costs, usually calculated on per acre or per head basis, is a very useful measure of the performance of an enterprise and the contribution that it can make to farm income or profitability.

The concept of gross margin is simple and easy to understand and can be used in many ways. It should be noted that the gross margin is not a profit measure. It is simply an estimate of the potential contribution that an individual enterprise can make to farm profit. The gross margins do vary from farm to farm and year to year due to varying influence of factors like soil, breed, market conditions, prices and the difference in farming practices. It is, therefore, wise that such factors particularly prices and techniques of production should be taken into account while using the concept of gross margins.

In working out the gross margins for livestock enterprises, an underlying assumption is that the calculations refer to a 'steady state' enterprise; that is, a productive animal is being kept in a herd where births (including male/female calf ratio), deaths, culls and replacements are consistent with the maintenance of a certain number of productive animals in a given year. For this reason, it is convenient to assume a herd size of 100, as any fraction derived from this number can readily be used for estimating costs and returns on a per head basis.

Let us consider Sahiwal cow enterprise (Table 6.2). The total output is derived from five elements which are milk, male and female calves, heifers, culls and manure. The proportional contributions of the two types of calves to output allow for mortalities amongst them before being sold. The culling rate of 7 percent is related to replacements coming to the herd at 12 percent as shown in the cost sections of the enterprise budget. Ideally, if there are no deaths or replacements then the two rates should be the same: but a higher replacement rate compensates for replacement mortality.

The working capital tied up in the production of one animal is assumed to be equivalent to its average value (that is half of the sum of replacement cost and the culling price) the interest charge is 12.5 percent of this sum.

Table: 6.2 Enterprise Budget For Livestock

Enterprise: Sahiwal Cow:

A.	<u>Output</u>	<u>Rate/Unit in rupees</u>	<u>Amount in rupees</u>
a)	Milk 2250 liter	4.5	10125
b)	Calf 0.39	700	273
c)	Heifer 0.29	2400	696
d)	Culls 0.07	6000	420
e)	Manure 160 Maunds	5	800
f)	Total Output (sum of a to e)		12341
B.	<u>Variable costs</u>		
a)	Fodder		
	Green 420 Maunds	8	3360
	Dry 90 Maunds	12	1080
b)	Concentrate 25 Maunds	100	2500
c)	Vet. & Medicine		100
d)	Bull Service Charge		50
e)	Replacement 12%	140000	1680
f)	Interest @ 12.5% per annum on average value		1250
g)	Labor (1/2 of total required)		1440
f)	Total Variable costs (Sum of a to g)-		11460
C.	<u>Gross margin per head (A-B)</u>		891

The fixed cost items include the remaining half of the labor requirements (Rs.1440), equipment cost (Rs.192) and interest on shed and space plus depreciation on shed (Rs.375). Thus the total cost of keeping a Sahiwal cow would be (Rs.13467) and the resulting per head net income would be (Rs.1153).

The return to labor is calculated by adding the labor cost back to the net income and then dividing the resulting sum by the labor cost. This comes to Rs.22 per day. The remaining two measures of performance are returns to feed cost in percent and returns to livestock capital in percent. The return to feed cost are estimated by adding the feed costs back to the net income and then dividing the resulting sum by the feed costs before multiplying by 100. It is within as 83 percent $[(-1153 + 6940)/6940]*100$. Similarly the estimate of the returns to livestock capital is obtained by adding the interest charge on the average value of the animal to the net income and dividing the sum by the average value of the animal before multiplying by 100. The result can be written as $[(-1153 + 1250)/100000]*100 = 1\%$.

COMPLETE BUDGET OR WHOLE FARM BUDGET

Complete budgeting refers to making out a plan for the whole farm or for all decisions of one enterprise. Complete budgeting considers all the enterprises and determines the prospective expenses and income resulting from a complete change in the choice and combination of farm enterprises, and a

complete reallocation of farm resources. The major objective of complete budgeting is to make the most efficient use of available resources that would in turn maximize the income.

Following steps are generally involved in developing an optimum plan with this budgeting technique.

1. **Inventory of resources**

Write down the amount of resources available on the farm such as land, labour, water, building, milch and draught animals, goats, sheep, camel, horses, donkeys, machinery and other capital, etc. One should walk around all over the farm and make a map. Soil of each acre may be identified such as sandy loam, clay loam etc, which would help the agronomists and others scientists in making recommendations to the farm planner. The topography of the land may also be noted as it defines the limits of growing different crops. One should also see the total availability of family labor, permanent hired labour and casual hired labor in different seasons. Information on total availability of water in different months is also very important in deciding the total acreage that can be placed under different crops. Similarly, one should know the amount of capital that is available and how much can be borrowed from various sources.

2. **Information on input output relationships**

Farm planner should collect all relevant information from various reports published by various experimental research

stations to learn about the available new and improved technologies and other improved practices, and various input-output coefficients related to the amount of each resource required to produce each product. Information from records and surveys can be used to derive the input-output coefficients for farm enterprises since a particular product can be produced using any of the different processes. Therefore, one should always select the most efficient technology.

3. Identification of Prices to be Used

For this purpose we need to know the prices of various products and inputs, which are never stable. The budgeting process is carried on to estimate the future process. Hence, the prices to be used in a farm plan must be the expected future prices, which can be forecast. There are various methods of forecasting prices. It is however beyond the scope of this book to discuss these methods. Farm planners can refer to the past to obtain normal prices; an average of three, four or five years is often useful. Future prices must also be based on the trends of past few years' prices, future expectations, government policies, changes in technology, etc.

4. Determining the Relative Profitability of Enterprises

A farmer should prepare an enterprise budget for each of his crop/livestock activity using data and information from his own records. Farm planner must also make enterprise budgets for all such crop/livestock activities that may be potential

enterprises to increase his income. The enterprise budgets show the net income associated with each enterprise. It is obtained by deducting variable cash expenses from gross income. It may be noted that profitability per unit of resource should always be calculated for a factor that is scarce. If land is the scarcest factor, especially where the tubewells are installed or sufficient water from other sources is available, one should see the profitability of various crops on per acre basis; but in situations where water is the real scarest factor, profitability of various crop enterprises may be determined on the basis of profit per acre inch of water. Similarly, in livestock enterprises one can see the profitability from the point of view of labor, feed and livestock capital. Finally, one can rank these crop enterprises according to their profits depending upon the scarest factor.

5. Examining the Existing Farm Plan and Identification of Handicaps and Shortcomings

In this step, one should diagnose the shortcomings and weaknesses in the present organization and operation of the farm. The extent of use of each resource and the level of output of each enterprise must also be examined in order to ensure the optimum use of the farm resources. One can see how the farm crops yield per acre and livestock production per animal unit compare with the prevailing standards. However the varieties of crops and breeds of animals being raised at the farm are suitable and whether the fertilization rates, present methods of fertilization and feeding rates meet the recommendations of the scientists, etc. Further, it is also ascertained whether the present

combination of enterprises allow full use of resources. It requires information about the costs and returns of various products, i.e., gross income, variable costs and net returns to fixed resources for each enterprise. Such an analysis will point out to the planner various weak links in the existing plan and will provide the guidelines what a farmer should grow in the alternative plan in order to effect the needed improvements in the existing returns.

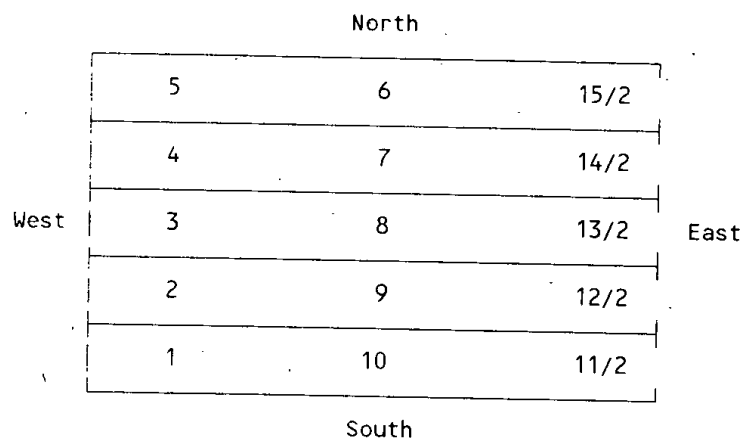
6. Preparation of Alternative Plans

Alternative plans should be developed by considering resource restrictions, weaknesses of existing organization and possibilities of introducing new technologies and new enterprises. More resources are allocated for the production of those farm products for which net returns (obtained by deducting variable costs from gross income) are higher. Sum of all net incomes from various enterprises, provides overall net farm income. One can then compare the potential profit of two or more plans and the plan promising highest returns to fixed factors within the resource restrictions is finally selected.

Various steps involved in the process of farm planning and budgeting are illustrated below for a typical 12.5 acre farm in Faisalabad District. These are: I) farm map; II) inventory of farm resources; III) input-output relationship and relative profitability; V) handicaps and shortcomings in the existing plan; and VI) preparation of alternative plans.

I Farm Map

Sketch of the farm is indicated below:



II. Inventory of farm Resources.

Details of farm resources are given below:

1. Land Holding:

- i) Land owned = 12.50 acres
- ii) Number of acres rented in =
- iii) Number of acres rented out =
- iv) Number of acres share cropped in =
- v) Number of acres share cropped out = -
- vi) Operational holding = $(i + ii + iv) - (iii + v) = 12.50$ acre

The soil is clay loam. Land is well drained and levelled. It is fit for cultivation of sugarcane, maize, rice, cotton, wheat, and Kharif and Rabi fodders.

2. Land Use

The farmer allocates his land to various crops as under:

Kharif Crops

Sugarcane	1.50 acres
Cotton	2.50 acres
Rice	0.50 acres
Maize	1.00 acres
Kharif Fodder	1.25 acres
Sub total in kharif	6.75 acres

Rabi Crops

Wheat	7.50 acres
Rapeseed & mustard	
Burseed	2.25 acres
Rabi crops total	9.75 acres

Grand total 16.50 acres

$$\text{Cropping Intensity} = \frac{16.50}{12.50} \times 100 = 132 \text{ percent}$$

3. Farm Labor

Availability of family male labor = 1.6 units

Availability of family female labor = 1 unit

Permanent hired labor is available but the cost of hiring such labor is quite high, i.e., Rs.10,000/year. Casual hired labor

is available in general but the farmers face labour shortage during the peak periods like harvesting of wheat, etc.

4. **Animal Strength**

Type of Livestock	Number
i) Nili Ravi	1
ii) Average milking buffalo	1
iii) Average milking cow	1
iv) Sheep	3
v) Beetal goat	2
vi) Taddy goat	5

5. **Farm Machinery and Equipment**

Machinery/Equipment	Number	Price/unit
i) Tractor	-	-
ii) Cultivator	-	-
iii) Trolley	-	-
iv) Thresher	-	-
v) Bullock Cart	1	3000/-
vi) Sprayer	-	-
vii) Kharif drill	-	-
viii) Rabi drill	-	-
ix) Other	-	-

6. **Buildings**

Type of Building	Size
i) Shed for animals	14' X 30'
ii) Tractor shed	-
iii) Store for grains	-
iv) Other specify	-

7. Working Capital

Farmer possesses reasonably sufficient owned and borrowed funds to invest in farm business.

8. Irrigation

The main source of irrigation is canal water. The underground water is not fit for irrigation. Therefore, tubewell water cannot be used to supplement the canal supplies. The availability of canal water during various month of the year are given below:

<u>Month</u>	<u>Total water availability in acre inches</u>
January	20
February	30
March	30
April	36
May	36
June	25
July	30
August	36
September	36
October	36
November	30
December	30

9. Management

The farmer is both a manager and a labourer at his farm. He possesses long experience in growing crops and rearing animals.

III and IV. Input - Output Relationship and Relative Profitability

It is assumed that the existing crop enterprises at the farm have optimum combination and are, therefore, ignored in further discussion. The input-output coefficients for livestock activities are assumed to be the same as already indicated under the enterprise budget. However, these coefficients may differ widely at various farms. Profitability of various livestock enterprises is indicated in (Table 6.3).

On the basis of profitability analysis in terms of gross margin per head, it can be seen that maintenance of Nili Ravi buffalo is highly rewarding (Rs.2009) followed by average milking cow (Rs.735), average milking buffalo (Rs.671), beetal goat (Rs.361) teddy goat (Rs. 247) and sheep (Rs.128). Total gross margin under the existing plan amounted to Rs.5756 (Table 6.4).

Feed is considered to be the most important limiting factor in livestock sector in Pakistan. Therefore, gross margin per rupee of feed fed to various categories of livestock was estimated. The results obtained are presented in Table 6.5. These show that gross margin per rupee of feed was maximum for the beetal goat (Rs.3.61) followed by sheep (Rs.2.13), teddy goat (Rs.1.37) average milking cow (Rs.0.42), Nili Ravi buffalo (Rs.0.27) and an average milking buffalo (Rs.0.18).

It may be noted that feed is not a limiting factor at many large farms. The scarcest factor at such farms is the farm labour; therefore, there is a need to determine the gross margin per labour day. Gross margin per labour day is also estimated and

presented in Table 6.6. It shows that gross margin per labor day is the highest for teddy goat followed by Nili Ravi buffalo and beetal goat. It is the lowest for an average milking buffalo.

V. Handicaps and shortcomings in the existing plan

Following weaknesses can be identified in the existing plan of livestock production (Table 6.7).

- i) As already mentioned, feed is the most important constraint in our livestock sector. Gross margin analysis done on the basis of feed expenditure suggests that the farmer should produce maximum possible number of beetal goat, followed by sheep and teddy goat. In the present plan there is a need to reduce the number of milking buffalo, cow and teddy goat. The number of beetal goats must be increased to improve the gross margin of the livestock enterprises.
- ii) The existing milk yield rates are quite low than the potential yields which could be obtained by applying improved animal husbandry practices.
- iii) Under the existing plan, the farmer is feeding very low quantities of concentrates to the dairy animals and no concentrates are being fed to sheep and goat.

VI. Preparation of Alternative Plans

The enterprises with highest level of gross margins per rupee of feed expense should be selected and the number of

heads should be increased. There could however be some constraints in the way of further expansion. In that situation, the second best enterprise should be selected and tried to optimize, until a constraint prevents further expansion. This procedure should be continued until all the feed available has been optimally allocated.

Availability of total feed is given in Table 6.8. Alternative plans are prepared keeping in view the existing weaknesses, feed availability restrictions and possibilities of incorporating modern technologies (Table 6.9). In plan I beetal goats and teddy goats have been increased, while buffaloes and cows have been eliminated. Output rates of expanded enterprises have increased due to better feeding and improved animal husbandry practices. Consequently, gross margin associated with each enterprise included in Plan I is higher as compared to the original plan. We have developed here only two alternative plans. However, one can make still more plans and can select a plan which promise the highest income to fixed farm factors.

