

Farm planning and management for trainers of extension workers

TRAINING
MATERIALS FOR
AGRICULTURAL
MANAGEMENT,
MARKETING
AND FINANCE

3

ASIA



Module 5 ENTERPRISE BUDGETING AND FARM PLANNING



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Module 5
ENTERPRISE BUDGETING
AND FARM PLANNING

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ENTERPRISE BUDGETING AND FARM PLANNING

Unit 5.1

Farm enterprise and partial budgeting

- Session 5.1.1 The use of enterprise budgeting in farm planning (40 minutes)
- Session 5.1.2 Break-even budgeting (60 minutes)
- Session 5.1.3 The use of partial budgeting (50 minutes)
- Session 5.1.4 Preparing a partial budget (60 minutes)

Unit 5.2

Whole farm plan and budget

- Session 5.2.1 Whole farm planning (60 minutes)
- Session 5.2.2 Maximizing farm income using available resources (60 minutes)

Unit 5.3

Labour planning

- Session 5.3.1 Planning farm labour (120 minutes)

Unit 5.4

Cash flow

- Session 5.4.1 The concept of cash flow (30 minutes)
- Session 5.4.2 Application of cash flow (120 minutes)

*This volume has been designed
as a complete working package which includes all components
of the training programme needed for Module 5.*

*The "trainers information box",
at the beginning of each session, lists the handouts,
training slides and exercises needed for that segment of the course.
The trainer's guide, in the section "steps for instruction",
suggests a sequence for the use of these training materials.
Mini-versions of all slides are provided at the end of each session.
Where appropriate, answer keys for training exercises are also provided.*

ENTERPRISE BUDGETING AND FARM PLANNING

Farmers are always looking toward the future. In order to increase profitability, extension workers need to be prepared to assist farmers plan their farm businesses. This module covers some of the tools and techniques that can be used in farm planning that can enable farmers to make better decisions.

Farm enterprise and partial budgeting

Farmers always look towards the future. Some decisions they might make when planning the enterprise and the farm as a whole are:

- *What crop should I produce and what variety or breed?*
- *What area of land do I need?*
- *How much should be produced?*

Forward-looking planning decisions are typically focused on the long term, but some decisions may also concern the immediate future.

The method of estimating the expected profitability of a farm enterprise is known as budgeting. The farmer as manager can prepare budgets to help make better decisions about which enterprises to expand, reduce or eliminate, which new enterprises to introduce and what adjustments to make in the organization.

This unit will examine the various forms of budgeting: (i) enterprise budgeting, (ii) break-even budgeting, (iii) partial budgeting.

The use of enterprise budgeting in farm planning

The concept of enterprise analysis, as discussed in Module 3, is reviewed in this session. However, the difference between enterprise analysis as a review exercise and enterprise budgeting as an aid to farm planning is explained. The strengths and weaknesses of enterprise budgeting and the steps involved in enterprise budgeting are described.

It is important for both farmers and extension workers to know how to prepare enterprise budgets and apply them to assess the relative contribution of individual enterprises to farm income.

Objectives

At the end of the session the participants are expected to:



- understand why there is a need for farm planning and budgeting;
- understand the concept of enterprise budget and its use in farm planning;
- know the steps in preparing a farm plan and budget.

Key points

1. Enterprise budgeting is used to conduct an assessment of the profitability of a proposed enterprise.
2. It is set out in the same way as enterprise analysis and includes the same sections. These are: (i) gross income, (ii) variable costs, (iii) fixed costs, (iv) measures of enterprise profitability.
3. Enterprise budgets can also be created for different levels of production or types of technology so there can be more than one budget for a given enterprise.

4. A change in enterprise budget margin can result from a combination of changes in:
 - the selling price of the produce;
 - the cost of production;
 - any variation in the product mix of the farm.

5. The steps involved in preparing enterprise budgeting are to compute the following:
 - all sources of gross income from each enterprise;
 - operating or variable costs;
 - fixed costs;
 - measures of profit of the enterprise.

Steps for instruction



1. Discuss the difference between enterprise analysis and budget. Explain that the former is concerned with historical data and the latter with projected data. Explain that unlike enterprise analysis, where actual/prevaling prices and yields are used, enterprise budgeting requires projected yields and prices. Point out that the format used for computation is the same.

2. Show Slide 71 (Enterprise budgeting) and discuss how enterprise budgets can be constructed for different levels of production or types of technology and that these are called activity budgets. Note that enterprise budgets are usually conducted on a per unit basis (acres/hectares/livestock).

3. Discuss with the participants some of the difficulties associated with budgeting. These include estimating yields, product prices and input costs. Point out that the usefulness of budgeting depends on the skills of farmers and extension workers in forecasting.

4. Explain that gross margins can also be used for enterprise budgeting. Remind the trainees that this budget covers only variable costs. Review how to compute a gross margin. Emphasize that changes in gross margin can be the result of a combination of changes affecting the selling price of produce, the cost of production and variations in the product mix of the farm.
5. Provide an example of an enterprise budget with the aid of Slide 72 (A detailed enterprise budget). Explain that it is possible to assess the technical and financial strengths and weaknesses of individual farm enterprises that contribute to the overall gross margin of the farm.
6. Using Slide 73 (Steps involved in enterprise budgeting) summarize the four major steps required. Discuss some of the difficulties in preparing enterprise budgets. Point out that the allocation of fixed costs to individual crops/livestock is a problem that often needs to be addressed.
7. Explain that livestock budgets have some unique problems in terms of the following: (i) budgeting unit, (ii) time period, (iii) multiple products, (iv) feeds. Guide the participants on how to allocate costs between enterprises.

Evaluation: (i) review objectives in relation to key points, (ii) refer to Handout 5.1.1.

Notes

The use of enterprise budgeting in farm planning

While enterprise analysis is an evaluation of past performance, enterprise budgeting is used to make an assessment of the expected profitability of a proposed enterprise. Enterprise budgets provide the basis for planning the next season's activities. Unlike enterprise profitability analysis where actual/prevailing prices and yields are used, enterprise budgeting calls for estimates of projected yields, prices, costs and input use.

Enterprise budgeting is similar to enterprise analysis in format and presentation. Enterprise budgeting consists of four parts: (i) gross income, (ii) variable costs, (iii) fixed costs, (iv) measures of enterprise profitability. Refer to Module 3 to recap the definitions of gross income, variable and fixed costs.

Each type of crop or livestock that can be grown is an enterprise. Enterprise budgets can also be constructed for different levels of production or types of technology. These budgets are more often called "activity budgets". There can be more than one budget for a given enterprise.

An enterprise budget can be calculated on a per unit basis, such as a hectare or acre of land or head of livestock, for either one year or one production period. The base unit, however, is typically a single unit. Using common units allows for easy comparison between different enterprises.

Enterprise budgets can be used for comparing the profitability of alternative enterprises to be proposed on a farm and are useful in developing a whole farm plan. The estimated profit from a given enterprise can be compared against the estimated profit from other enterprises. It is used to select the most profitable enterprises to engage in. Once completed, an enterprise budget contains the data needed to compute average cost of production, the break-even price and the break-even yield.

Budgets are used to plan farm enterprises ...

... compare future profitability and appraise technologies

Budgeting depends on an ability to predict the future

There are often problems in estimating prices, levels of production and costs because there is much uncertainty in farming. This is particularly true when new enterprises are being considered. But there are ways to deal with these problems. This will be discussed in more detail in Unit 6.2 of Module 6 on managing risk. More crucial are the skills and judgement needed when estimating averages over a period of years. The value of budgeting depends on the skills that farmers with the support of extension workers have in forecasting and planning for the future. The more experienced the farmer and extension worker and the simpler the farm, the more precise the enterprise budget is likely to be.

As mentioned in Module 3, gross margin is the difference between gross income and total variable cost. Enterprise profit is the return after taking into account allocable fixed costs.

Example
A gross margin budget, Philippines

Farm enterprises	Gross income \$/ha	Variable costs \$/ha	Gross margin \$/ha	Area ha	Total gross margin \$
Carrots	180	83	97	0.5	48.50
Yams	120	80	40	1.0	40.00
Cabbages	210	105	105	0.3	31.50
Peppers	280	109	171	1.0	171.00
Total	790	377	413	2.8	291.00

A positive gross margin contributes towards covering the fixed costs of the farm. Maximizing the gross margin is equivalent to maximizing profit (or minimizing losses) because fixed costs for small farmers are often low and change only slightly.

Extension workers should remember that a change in gross margin can result from any combination of changes with respect to the:

- selling price of the produce;
- costs of production;
- level of production;
- level of input use;
- variations in the product mix (e.g. other enterprises).

Budgets can be divided into physical and financial parts.

Example
A detailed enterprise budget for rice (1 ha)

Item	Unit	Quantity	Price (\$)	Amount (\$)
Rice sales	Tonnes	2.5	80.00	200.00
<i>Gross income</i>				<i>200.00</i>
Variable costs				
Seed	Kg	84	0.25	21.00
Fertilizer				
Nitrogen	Kg	77	0.30	23.10
Phosphorous	Kg	35	0.10	3.50
Chemicals				19.00
Labour (hired)				2.00
Miscellaneous costs				7.00
Interest on working capital (10% for 4 months)				5.60
<i>Total variable costs</i>				<i>81.20</i>
<i>Gross margin</i>				<i>118.80</i>
Fixed costs				
Machinery depreciation				10.00
Fixed labour				13.00
Land charge (rent)				15.00
Storage costs				3.00
<i>Total fixed costs</i>				<i>41.00</i>
Total costs				122.20
Enterprise profit				77.80

*Precise planning
is essential
for enterprise
budgets ...*

*... and a detailed
breakdown
is needed for
good budgeting*

Training slides
for Session 5.1.1
**The use of enterprise budgeting
in farm planning**

71 Enterprise budgeting

Enterprise budgeting contains four parts ...

- gross income
- variable costs
- fixed costs
- measures of enterprise profitability

Enterprise budgeting can be used to ...

- assess the expected profitability of an enterprise
- compare the profitability of alternative enterprises
- develop a whole farm plan

72 A detailed enterprise budget

Item	Unit	Quantity	Price (\$)	Amount (\$)
Rice sales	Tonnes	2.5	80.00	200.00
<i>Gross income</i>				<i>200.00</i>
Variable costs				
Seed	Kg	84	0.25	21.00
Fertilizer				
Nitrogen	Kg	77	0.30	23.10
Phosphorous	Kg	35	0.10	3.50
Chemicals				19.00
Labour (hired)				2.00
Miscellaneous costs				7.00
Interest on working capital (10% for 4 months)				5.60
<i>Total variable costs</i>				<i>81.20</i>
<i>Gross margin</i>				<i>118.80</i>
Fixed costs				
Machinery depreciation				10.00
Fixed labour				13.00
Land charge (rent)				15.00
Storage costs				3.00
<i>Total fixed costs</i>				<i>41.00</i>
<i>Total costs</i>				122.20
Enterprise profit				77.80

Module 5, Unit 5.1, Session 5.1.1

73 Steps involved in enterprise budgeting

- Step 1. Compute all sources of gross income from each enterprise**
(main product and by-products)
- Step 2. Compute operating or variable costs**
- Step 3. Compute fixed costs**
(machinery and equipment depreciation, interest on fixed capital investment and land charge)
- Step 4. Compute the measures of profit of the enterprise**

Module 5, Unit 5.1, Session 5.1.1

Break-even budgeting

The changes in gross margin and enterprise profit have previously assumed average values. However, averages can be deceiving. They represent the common mid-point between two extremes and often portray a picture that does not reflect the actual situation. In this session, we shall investigate what happens when we move away from the average case. The trainee is introduced to the concept of break-even budgeting as a tool for enterprise budgeting and farm planning. Extension workers are taught how to calculate the break-even yield and price and to interpret the results by way of simple examples.

In break-even budgeting, the farmer can determine the minimum yield and output price needed to recover the variable costs or total cost incurred in using a given technology or improved farm practice.

Objectives

At the end of the session, the participants are expected to:



- understand the concept of break-even budgeting and know its uses;
- know how to calculate the break-even yield and break-even price.

Key points

1. Break-even analysis studies the relationship between costs and income at different levels of production. This is useful because the data included in enterprise budgets are averages and there is a risk that these averages will not be realized.
2. The data contained in enterprise analysis can be used to perform the break-even analysis for prices and yields.
3. A break-even budget estimates the maximum acceptable level of a cost item or the minimum acceptable level of a income, given an estimated level of cost.

4. Break-even yield refers to the yield required to recover the costs incurred in production at given prices of products and inputs.
5. Break-even price refers to the product price needed to recover all the costs incurred in production at a given level of output and price of input.
6. Break-even prices and yields can be calculated from both total costs and variable costs.
7. Break-even yields and prices should be compared with the actual values. If the actual values are higher than the computed break-even values, it is profitable to proceed with the enterprise. Otherwise losses are likely to be incurred.

Steps for instruction



1. Distribute Handout 5.1.2 (Break-even budgeting) to the participants before the session begins.
2. Show Slide 74 (What is break-even budgeting?) and explain the concept. Point out that farmers and extension workers can calculate the minimum yield and product price needed to recover the variable costs. Explain that break-even prices and yields can be calculated from either total costs or variable costs. Stimulate a discussion on the subject.
3. Explain how break-even calculations are carried out with the aid of Slide 75a (A simple break-even budget), Slide 75b (Diagram of a break-even point), Slide 76 (Calculating break-even yield), Slide 77 (Calculating break-even price).

4. Conclude the session by discussing other uses of break-even budgets. Encourage discussion by asking questions such as:
 (i) How can it be used for setting prices? (ii) Why aren't fixed costs included? Some of the points that might be raised by the participants in the discussion are that:

- Break-even budgeting is a very useful tool for pricing farm produce. By using the break-even analysis in competitive pricing, a farmer can determine how to lower prices, sell more without losing and, thus, compete with other suppliers.
- Only variable costs need to be considered in the break-even analysis because fixed costs are always present whether or not a farmer produces. It is more important for farmers to recover the variable costs from the product price set.

These points should be raised in the discussion.

Evaluation: (i) review objectives in relation to key points, (ii) refer to Handout 5.1.2.

Notes

Break-even budgeting

Break-even budgeting is a technique for studying the relationship between costs and income at different levels of production. A break-even budget estimates the maximum acceptable level of a cost item or alternatively, the minimum acceptable level of income given an estimated level of cost. In other words, it looks at the scale of the enterprise when income equals cost. At this point, profits or gross margins are zero.

The results obtained from actual farm conditions are often very different from the values included in the enterprise budget. Yields and output prices often vary considerably in reality because of changes in many factors. It is, therefore, useful to determine the minimum yield and product price required that enables the farmer to recover the variable and total costs incurred in farm enterprise production. The information included in enterprise analyses can be used to perform break-even analysis for product prices and yields. The break-even values can be calculated from both variable and total costs.

In preparing a break-even budget the values of all the variables except a selected variable are known. For example, a farmer might be interested in substituting one variety of tomato for another, although the production potential of the new variety is unknown. In this situation, the break-even budget is constructed to estimate the minimum yield that would have to be achieved to make the change worthwhile. Alternatively, if the expected yield is known but the price is unknown, the budget could indicate the minimum price that must be obtained to make the change economically feasible.

Break-even budgeting examines cost and income at different levels of production or price

It determines the minimum yield and price needed to cover costs

Farmers should be aware of the point at which they start making a profit. This requires that the farm's fixed costs have to be taken into account and covered by the income generated from farm enterprises. The higher the fixed costs, the longer it will take for the business to break even and make a profit. It is, therefore, vital to keep fixed costs down to a minimum.

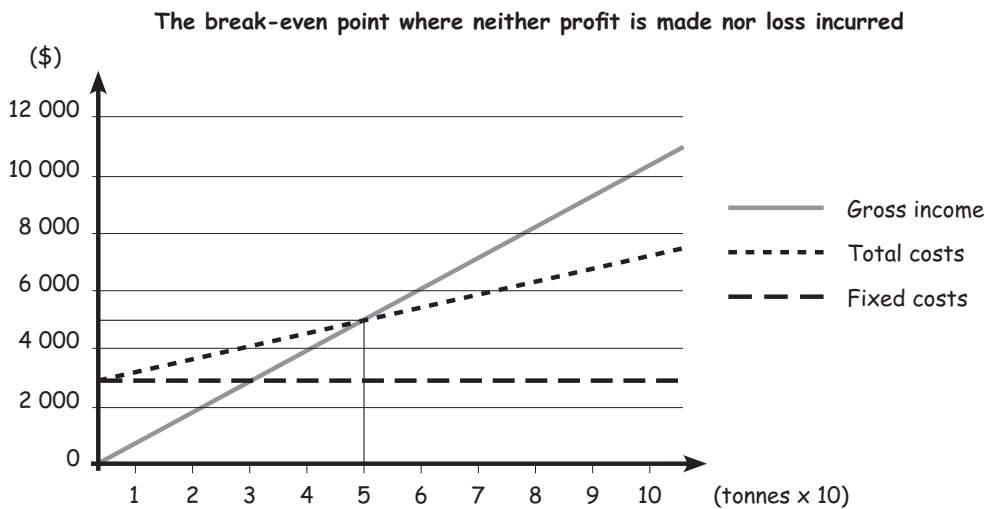
Example

A simple break-even budget

A farmer intends to sell fruit at \$100 per tonne. The variable costs are \$40 per tonne, and fixed costs are estimated at \$3 000. The farmer carries out a market investigation that suggests that 100 tonnes of fruit could be sold at this price. The farmer wants to calculate the break-even point for sales and estimate how much profit can be earned.

This can be calculated and shown as a graph. The graph opposite shows that the farmer would need to sell 50 tonnes of produce at a value of \$5 000 in order to cover the variable and fixed costs (total costs) of production. This would be the break-even point before beginning to generate a profit. If the farmer increases sales to 100 tonnes, then a profit of \$3 000 will be earned.

Units sold (tonnes)	Sale price (\$)	Gross income (\$)	Variable costs (\$)	Fixed costs (\$)	Total costs (\$)	Enterprise profit (\$)
0	100	0	0	3 000	3 000	- 3 000
10	100	1 000	400	3 000	3 400	- 2 400
20	100	2 000	800	3 000	3 800	- 1 800
30	100	3 000	1 200	3 000	4 200	- 1 200
40	100	4 000	1 600	3 000	4 600	- 600
50	100	5 000	2 000	3 000	5 000	0
60	100	6 000	2 400	3 000	5 400	600
70	100	7 000	2 800	3 000	5 800	1 200
80	100	8 000	3 200	3 000	6 200	1 800
90	100	9 000	3 600	3 000	6 600	2 400
100	100	10 000	4 000	3 000	7 000	3 000



The break-even point at which neither profit is made nor loss incurred is plotted above. The total costs of the farm enterprise would be the same as gross income.

Break-even yield

The break-even yield provides information on the yield required to make the enterprise profitable. This is the yield necessary to cover all costs at a given product price.

$$\text{Break-even yield} = \frac{\text{Total costs}}{\text{Product price}}$$

If total costs (fixed + variable) are \$157.50 per hectare and the product price is given to be \$80/tonne ...

$$1.97 \text{ tonne per ha} = \frac{\$ 157.50 \text{ per ha}}{\$ 80 \text{ per tonne}}$$

Information on the break-even yield is needed to make the enterprise profitable

Because the product price is only an estimate, it is often useful to compute the break-even yield for a range of possible prices. This provides some insight into the sensitivity of the break-even yield to changes in the output price as shown below.

Product price (\$ per tonne)	Break-even yield (tonnes per ha)
40	3.94
50	3.15
60	2.63
80	1.97
90	1.75

Interpretation of break-even yield. If the actual yield is higher than 1.9 tonnes per ha (the break-even yield), it will be profitable for the farmers to grow the crop. Conversely, if actual yield is lower than its break-even yield, farmers will incur a loss if the crop is grown.

Break-even price

The break-even price is the product price needed to just cover all costs at a given production level.

$$\text{Break-even price} = \frac{\text{Total costs}}{\text{Expected yield}}$$

Using an expected yield of 2.5 tonnes with the same total costs (\$157.50) as before ...

$$\text{\$63 per tonne} = \frac{\text{\$157.50}}{2.5 \text{ tonnes}}$$

Provides information on the price needed to make the enterprise profitable

Notice that the break-even price is the same as the total cost of production. These are only two different ways of looking at the same value.

The break-even price can also be computed for a range of possible yields as in the following table. Different yields cause different break-even prices (and cost of production), and these prices can vary widely depending on the yield level.

Expected yield (tonnes)	Break-even price (\$)
1.0	157.50
1.5	105.00
2.0	78.75
2.5	63.00
3.0	52.50
3.5	45.00

Interpretation of break-even price. If the price of the product is above the break-even price, it will be profitable to grow the crop. Conversely, if the price of the product is below \$63 per tonne, farmers will incur a loss if they decide to cultivate the crop.

Since costs, yields and output prices in an enterprise budget are estimated values rather than actual values, the calculation of the break-even points, yields and prices can assist farmers in making better decisions. By studying the various combinations of the break-even point, yields and prices, farmers can form their own expectations about the chance of obtaining a price and a yield that would just cover total costs. Break-even prices and yields can also be calculated from total variable costs rather than total costs of production.

Notes

Training slides
for Session 5.1.2
Break-even budgeting

74 What is break-even budgeting?

**Break-even budgeting is a technique
for studying the relationship between costs and income
at different levels of production**

**A break-even budget estimates
the maximum acceptable level of a cost item
or alternatively, the minimum acceptable level of income
given an estimated level of cost**

*Thus, it looks at the scale of the enterprise
where income equals cost
at which point profits or gross margins are zero*

75a A simple break-even budget

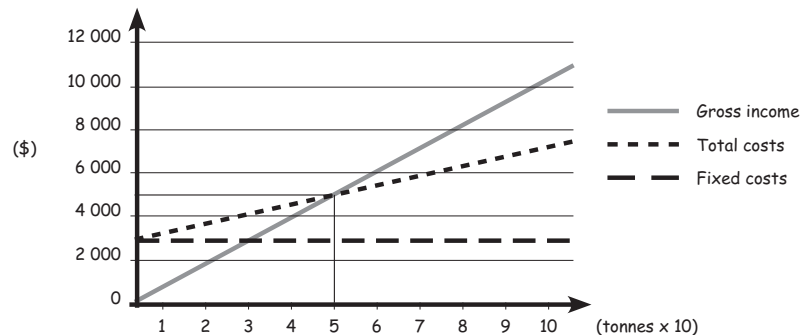
Units sold (tonnes)	Sale price (\$)	Gross income (\$)	Variable costs (\$)	Fixed costs (\$)	Total costs (\$)	Enterprise profit (\$)
0	100	0	0	3 000	3 000	- 3 000
10	100	1 000	400	3 000	3 400	- 2 400
20	100	2 000	800	3 000	3 800	- 1 800
30	100	3 000	1 200	3 000	4 200	- 1 200
40	100	4 000	1 600	3 000	4 600	- 600
50	100	5 000	2 000	3 000	5 000	0
60	100	6 000	2 400	3 000	5 400	600
70	100	7 000	2 800	3 000	5 800	1 200
80	100	8 000	3 200	3 000	6 200	1 800
90	100	9 000	3 600	3 000	6 600	2 400
100	100	10 000	4 000	3 000	7 000	3 000

(the break-even point is diagrammed in Slide 75b)

Module 5, Unit 5.1, Session 5.1.2

75b Diagram of a break-even point

The break-even point at which neither profit is made nor loss incurred



All enterprises must remain profitable, so the break-even point should be closely watched

Module 5, Unit 5.1, Session 5.1.2

76 Calculating break-even yield

Break-even yield provides information on the yield required to make an enterprise profitable

$$\text{Break-even yield} = \frac{\text{Total costs}}{\text{Product price}}$$

So, if **total costs** (fixed + variable) are **\$157.50 per hectare** and the **product price** is given to be **\$80 per tonne** ...
... then the **break-even yield** is **1.97 tonnes per hectare**

Since the **product price** is an estimate, it is useful to compute the break-even yield for a range of possible prices* as shown in the chart

Product price (\$ per tonne)	Break-even yield (tonnes per ha)
40	3.94
50	3.15
60	2.63
80	1.97
90	1.75

*at the same total cost of \$157.50

Module 5, Unit 5.1, Session 5.1.2

77 Calculating break-even price

Break-even price is the product price needed to just cover all costs at a given production level

$$\text{Break-even price} = \frac{\text{Total costs}}{\text{Expected yield}}$$

So, if **total costs** (as before) are **\$157.50 per hectare** and the **expected yield** is given to be **2.5 tonnes** ...
... then the **break-even price** is **\$63 per tonne**

Since the **expected yield** is an unknown it is useful to compute the break-even price for a range of possible yields* as shown in the chart

Expected yield (tonnes)	Break-even price (\$)
1.0	157.50
1.5	105.00
2.0	78.75
2.5	63.00
3.0	52.50
3.5	45.00

*at the same total cost of \$157.50

Module 5, Unit 5.1, Session 5.1.2

The use of partial budgeting

This session explains the concept of partial budgeting and its importance. It also introduces a simple format that can be used when preparing a partial budget. Partial budgeting is an important planning tool used by farmers to estimate the effect of relatively minor adjustments on the farm and its effect on overall farm profit.

Objectives

At the end of this session the participants are expected to:



- understand the concept of partial budgeting;
- use the partial budget as a tool to assess the effects of marginal changes involving several enterprises within the farm.

Key points

1. Partial budgeting looks only at those income and expense items that are affected by the proposed change. It is different from a total budget.
2. It evaluates whether or not the proposed change would be more profitable than the current situation. It shows the net farm income from proposed changes.
3. Partial budgeting is "testing it out on paper" before committing resources to a plan or to a change in an existing plan.

4. Partial budgeting can be used to:

- compare two different systems of farming;
- help determine the profitability of varying input applications;
- enable the farmer to choose the plan that gives better results;
- help determine the best age to market crops, poultry and livestock.

5. The following information is needed in partial budgeting:

- the prices of both inputs and outputs;
- the costs and returns of the old practice/resource/plan;
- the costs and returns of the new practice/resource/plan.

From this information the added costs, as well as the reduced costs and returns of both the old and new practice/resource/plan, can be calculated.

Steps for instruction



1. Distribute Handout 5.1.3 (The use of partial budgeting in enterprise and farm planning) before the start of the session.
2. Define partial budgeting with the aid of Slide 78 (What is partial budgeting?).
3. Explain when partial budgeting should be used with the aid of Slide 79 (When to use partial budgets). Point out that it is used to compare two different cultural practices or systems of farming, determine the profitability of varying input applications, choose which practice or plan gives better results, and to determine the best age to market crops, poultry and livestock. Give examples to promote understanding. Elaborate the situations mentioned above with the aid of Slides 80 a, b, and c; Slides 81 a, b and c; Slide 82.

The use of partial budgeting

Partial budgeting is a planning tool used by farmers to estimate the effect on farm profit of a particular change to an enterprise or activity within the farm. It looks only at those income and expense items that are affected by a proposed change. This differs from a total budget that includes the income and expenses for the entire farm. The partial budget looks at the economic and non-economic benefits and costs of proposed changes. Many of the day-to-day decisions made by farmers are really an adjustment of an existing farm plan.

Partial budgeting can be useful when there are proposed changes to a farm such as expansion, introducing a new enterprise, purchasing machinery or equipment, or even down-sizing the farm. These adjustment decisions often affect income and expenses. Thus, partial budgeting is a valuable instrument that shows the effect of marginal changes on overall profitability and, in particular, choosing between technologies and enterprises. It is a form of marginal analysis designed to show the net increase or decrease in net farm income resulting from the changes rather than to show the profit or loss for the farm as a whole.

Four basic items to be considered in partial budgeting

Cost (-)	Income (+)
(a) additional costs	(c) additional income
(b) income lost	(d) costs saved

The partial budget evaluates whether or not the proposed change would be more profitable than the current situation. The difference between (a + b) and (c + d) will indicate whether the change is profitable. If (c + d) exceeds (a + b), the change increases farm income, provided that it is technically feasible.

Partial budgeting shows the affect of small changes on farm profit

Small changes to the farm business are often all that is needed

When to use partial budgets

Many small reorganization problems involve partial budgeting. These are undertaken when the basic farm plan is not changed, and the farmer is concerned with the marginal costs and returns resulting from a small change. In many cases where the farm is already planned, partial budgeting for small adjustments may be all that is required. In practice it is not always easy, or even feasible, to collect information on all the inputs and outputs for an enterprise or technology. Partial budgeting does not require this to be done. The tool only requires information about those outputs and inputs (i.e. both expressed in monetary or value terms) that will actually change as a result of small adjustments to the farm business.

Many changes that do not require a complete reorganization of the farm can frequently be identified. Farmers can employ their resources in more than a single way in response to changes in prices, market demand and the cropping pattern. Partial budgets are useful to evaluate changes such as:

- expanding an enterprise;
- selecting alternative enterprises;
- selecting different production practices;
- deciding whether to purchase or hire equipment;
- making a capital improvement;
- buying new equipment to replace hand labour or maintaining the older equipment.

Partial budgeting is based on the principle that a small change in the organization of a farm will have one or more of the following effects:

- eliminate or reduce some costs;
- eliminate or reduce some gross income;
- cause additional costs to be incurred;
- cause additional gross income to be received.

Partial budgeting gives an idea whether the proposed change is better or worse in terms of profitability compared with the actual situation. However, it cannot by itself indicate whether both the "before" and "after" situations are profitable. Gross margins are used to do this.

Examples
The use of partial budgets

To compare two different systems of farming such as:

- direct seeding vs transplanting;
- hand weeding vs herbicide application;
- pesticide application vs integrated pest management (IPM);
- manual threshing vs machine threshing;
- winnowing by wind vs winnowing by fan;
- sun drying vs use of mechanical dryer.

To help determine profitability by varying inputs:

- working 10 vs 15 labour days on the farm;
- applying 3 bags vs 4 bags of fertilizer;
- applying 2 pints vs 3 pints of weedicide;
- sowing 2 cavans vs 3 cavans of seeds per hectare;
- transplanting vs direct seeding in planting;
- use of animal vs hand tractor in land preparation;
- sun drying vs use of mechanical dryer;
- applying 1 bottle vs 2 bottles of insecticide;
- using Azolla vs chemical fertilizer.

To choose the plan which gives better results:

- buying vs renting a farm machine;
- feeding poultry with home-made vs commercial feeds;
- using pump vs gravity as source of power in irrigation;
- early planting to take advantage of high prices vs seasonal planting.

To help determine the best age to market crops, poultry and livestock:

- marketing 5-week-old vs 6-week-old broilers;
- marketing 3-month-old vs 4-month-old hogs;
- marketing young vs old coconuts;
- marketing young coconuts vs "tuba" gathering;
- marketing fresh maize vs dried kernels;
- pick-up vs delivered in marketing farm products
- selling fresh vs processed products.

Information needed in partial budgeting:

- prices of both inputs and outputs;
- costs and returns of the old practice/resource/plan;
- costs and returns of the new practice/resource/plan.

From this information, the added as well as the reduced costs and income of both the old and new practice/resource/plan can be calculated.

Preparing for partial budgeting

The items to be considered when preparing a partial budget are shown below. It is important to note that the categories on the right side of the form are the two that increase profit (additional income and saved costs). On the left side are the two that reduce profit (decreases in income and increases in costs). Entries on the two sides can be summed up and compared to find the net change in income.

Additional costs (-)	Additional income (+)
Things you will have to buy because of the change or new activity.	New or extra things that you will be able to sell or eat if you make this change.
Only include a share of the total cost of capital items that will last longer than the period of the budget.	Costs saved (+)
Income lost (-)	Things you will stop buying as a result of the change.
Things you will no longer have to sell or eat if you make this change.	You will only save a share of the cost of equipment that lasts longer than the period of the budget.

Example

Problem: whether to introduce hybrid ducks or continue raising local Malaysian ducks

The shift from local ducks to hybrid ducks brings both advantages and disadvantages such as (i) *Additional costs*: bigger shelter, extra labour, water and feed; (ii) *Income lost*: results from decreased sales of meat; (iii) *Additional income*: results from the increased weight of birds; (iv) *Costs saved*: less cost for veterinarian and health care. This example continues on the following page.

The overall additional gross income together with the reduced costs is \$140.5. In contrast, the total additional costs and reduced gross income is \$172.0. This results in a net change in profit of -\$31.5. This negative difference shows that the introduction of hybrid ducks would actually decrease profit. A complete breakdown of the figures indicated above is given in the partial budget format shown below.

Partial budgeting – hybrid vs Malaysian

Additional costs (-)	(\$)	Additional income (+)	(\$)
<i>Fixed costs</i>		Added weight 60 kg (1 kg x \$1.25)	75.0
Bigger shelter	50.0		
<i>Variable costs</i>		Manure 30% weight (1 kg x \$0.05)	9.0
Extra labour	10.0		
Extra water	5.0	Feathers 5% weight (1 kg x \$0.50)	1.5
Extra feed	50.0		
<i>Subtotal</i>	<i>115.0</i>	<i>Subtotal</i>	<i>85.5</i>
Income lost (-)		Costs saved (+)	
Malaysian duck (40 kg x \$1.25)	50.0	Vet and health	20.0
Manure 15% weight (1 kg x \$0.05)	3.0	Mortality	5.0
Feathers 2% weight (1 kg x \$0.50)	4.0	Feed efficiency	30.0
<i>Subtotal</i>	<i>57.0</i>	<i>Subtotal</i>	<i>55.0</i>
(a) Total additional costs and reduced gross income	172.0	(b) Total additional gross income and reduced costs	140.5
			172.0
		Net change in profit (b - a)	-31.5

Training slides
for Session 5.1.3
The use of partial budgeting

78 What is partial budgeting?

**A planning tool to estimate the effect on net profit
of a particular change to an enterprise activity
within the farm**

**It evaluates whether or not
a proposed change to the farm
would be more profitable than the current situation**

Cost (-)	Income (+)
(a) additional costs	(c) additional income
(b) income lost	(d) costs saved

*The difference between $(a + b)$ and $(c + d)$ will indicate
whether the change is profitable. If $(c + d)$ exceeds $(a + b)$,
the change increases farm income, provided that it is technically feasible.*

79 When to use partial budgets

Farmers can employ their resources in more than a single way in response to changes in product prices, market demand and the cropping pattern. Partial budgets are useful to evaluate changes such as ...

- expanding an enterprise
- selecting alternative enterprises
- selecting different production practices
- deciding whether to purchase or hire equipment
- making a capital improvement
- buying new equipment to replace hand labour or maintaining the older equipment

Module 5, Unit 5.1, Session 5.1.3

80a Compare two different systems of farming

RICE



Direct seeding vs transplanting

Module 5, Unit 5.1, Session 5.1.3

80b Compare two different systems of farming



Manual threshing vs machine threshing

Module 5, Unit 5.1, Session 5.1.3

80c Compare two different systems of farming



Winnowing by wind vs winnowing by fan

Module 5, Unit 5.1, Session 5.1.3

81a Determine profitability by varying inputs

Applying fertilizer



3 bags vs 4 bags



Module 5, Unit 5.1, Session 5.1.3

81b Determine profitability by varying inputs

Applying weedicide



2 litres vs 3 litres



Module 5, Unit 5.1, Session 5.1.3

81c Determine profitability by varying inputs



Use of animal vs tractor in land preparation

Module 5, Unit 5.1, Session 5.1.3

82 Choose the plan which gives better results



Early planting to take advantage of high prices
vs
planting in season

Module 5, Unit 5.1, Session 5.1.3

83 Format for a partial budget

Categories on the left side increase profit while categories on the right side decrease profit

Additional costs (-)

Things you will have to buy because of the change or new activity.

Only include a share of the total cost of capital items that will last longer than the period of the budget.

Income lost (-)

Things you will no longer have to sell or eat if you make this change.

Additional income (+)

New or extra things that you will be able to sell or eat if you make this change.

Costs saved (+)

Things that you will be able to stop buying as a result of the change.

You will only save a share of the cost of equipment that lasts longer than the period of the budget.

Module 5, Unit 5.1, Session 5.1.3

84 Example of partial budgeting

Additional costs (-)	(\$)	Additional income (+)	(\$)
<i>Fixed costs</i>		<i>Added weight 60 kg</i>	
Bigger shelter	50.0	(1 kg x \$1.25)	75.0
<i>Variable costs</i>		<i>Manure 30% weight</i>	
Extra labour	10.0	(1 kg x \$0.05)	9.0
Extra water	5.0	<i>Feathers 5% weight</i>	
Extra feed	50.0	(1 kg x \$0.50)	1.5
<i>Subtotal</i>	<i>115.0</i>	<i>Subtotal</i>	<i>85.5</i>
Income lost (-)		Costs saved (+)	
Malaysian duck		Vet and health	20.0
(40 kg x \$1.25)	50.0	Mortality	5.0
Manure 15% weight		Feed efficiency	30.0
(1 kg x \$0.05)	3.0		
Feathers 2% weight			
(1 kg x \$0.50)	4.0		
<i>Subtotal</i>	<i>57.0</i>	<i>Subtotal</i>	<i>55.0</i>
(a) Total additional costs and reduced gross income	172.0	(b) Total additional gross income and reduced costs	140.5
			172.0
		Net change in profit (b - a)	-31.5

Module 5, Unit 5.1, Session 5.1.3

Preparing a partial budget

The step-by-step procedure presented in this session should simplify the preparation of a partial budget. This would be useful for both extension workers and farmers.

Objectives



At the end of the session, the participants should be able to prepare a partial budget for a given proposed change in the farm.

Key points

There are seven steps to be followed in preparing a partial budget:

1. State the proposed change.
2. List the added annual gross income from the proposed change by considering the costs and income of both the old and new plan. Use the prescribed partial budgeting form.
3. List the reduced costs from the proposed change.
4. List the added costs.
5. List the reduced annual gross income.
6. Estimate the change in net profit by subtracting the total additional costs and reduced income from the total additional income and reduced costs. If the difference is positive, it is profitable to proceed with the change, otherwise losses will be incurred.
7. Consider the non-economic factors of the proposed change, such as the safety issue of the machinery, the ease of use, or any social aspects of having more/less family workers working on the farm.

Steps for instruction

1. Distribute Handout 5.1.4 (Preparing a partial budget) to the participants before the start of the session.
2. Discuss the process in preparing a partial budget, such as stating the proposed change, listing the added income, listing the reduced costs, listing the added costs, listing the reduced income, estimating the net change in profit and looking at the non-economic considerations of the change. Explain the procedures with the aid of Slide 85 (Steps in preparing a partial budget).
3. Explain the use of partial budgeting using the example in Handout 5.14 (5-week vs 6-week-old broilers). Explain how to arrive at the entries for each component of the budget.
4. Point out that after computing the change in net profit and before implementing the planned change, there is a need to examine the non-economic considerations involved in the change. These are: (i) availability of inputs or outputs, (ii) labour and capital requirements, (iii) effect of management, (iv) personal preferences/culture, (v) effect on the environment. Cite examples.
5. Distribute Training exercise 12 (Partial budgeting). Have each participant to do the exercise individually. Once the exercise is completed start a discussion on the problem.

Evaluation: (i) review objectives and key points, (ii) refer to Handout 5.1.4, (iii) refer to Training exercise 12.

Notes

Preparing a partial budget

The seven steps in preparing a partial budget are illustrated using the example below.

Example

Poultry farmers would like to determine the best time to market their broilers (How would they assess whether it is profitable?)

Step 1

State the proposed change
(marketing of 5-week-old vs 6-week-old broilers)

Step 2

List the added annual gross income from the proposed change

Consider the costs and income between marketing 5- or 6-week-old broilers and enter all computations in the partial budget format (see Step 7). Expenses and returns can be computed using the following technical assumptions based on ten broilers.

- **Feeds** consumption is 0.59 kg per bird for the 5th week and 0.64 kg per bird at the 6th week or an increase of 0.05 kg per bird per week \times 10 birds = 0.5 kg \times \$4.1 per kg = **\$2.05**.
- **Labour** cost per 10 broilers calculated at **\$0.25 per week**. (The value of the farmer's labour is based on the prevailing market wage as if all labour were hired.)
- **Water** cost is calculated at **\$0.16 per week**.
- **Gain in weight** between the 5th and 6th weeks is 0.23 kg per bird \times 10 broilers = 2.3 kg \times \$4.1 per kg = **\$9.43**.
- **Manure** sold is estimated at 31 percent of body weight and valued at \$0.06 (0.31 \times 0.23 kg = 0.71 kg \times \$0.06 = **\$0.04**).

Based on these assumptions the additional income will be **\$9.47** per production cycle for 10 broilers.

Step 3**List the reduced costs from the proposed change**

In this example, raising broilers for one more week will not result in any reduction in cost.

Step 4**List the added costs**

The added costs considered are feeds, labour and water. Note that as birds grow older, feed consumption increases and therefore feed cost also increases. This rise in feed cost decreases the added net income as birds grow older. Vaccination of birds is done during the 2nd and 5th weeks. That is why the cost of vaccine is not considered as an added cost. Light is also not used from the 5th to the 6th week so that no expense in electricity is incurred. Other costs, such as interest on capital and depreciation, are fixed costs common to both and should not be considered under added costs.

Step 5**List the reduced annual gross income**

In this example, there are no reduced returns. However, if raising broilers for another week will result in the death of some birds, then it would result in reduced sales.

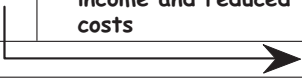
Step 6**Estimate the net change in profit**

Summarize the net effect on profit. In this example, the net farm income would increase by \$7.01 because of the additional one week of raising broilers (e.g. from 5 weeks to 6 weeks).

**Step 7
Non-economic considerations**

Look at the non-economic factors of the change, such as the safety issue of the machinery, the ease of use or any social aspects of having more or fewer family members working on the farm.

Partial budget of marketing 5-week-old vs 6-week-old broilers
(based on 10 birds)

Additional costs (-)	(\$)	Additional income (+)	(\$)
Feeds	2.05	Gain in weight	9.43
Labour	0.25	Manure sold	0.04
Water	0.16		
<i>Subtotal</i>	<i>2.46</i>	<i>Subtotal</i>	<i>9.47</i>
Income lost (-)		Costs saved (+)	
None		None	
(a) Total additional costs and reduced income	2.46	(b) Total additional income and reduced costs	9.47
			2.46
Net change in profit (b - a)			7.01

In this example, in deciding whether to raise the broiler from 5 weeks to 6 weeks, the farmer would look at the fact that net farm income increased by \$7.01 per production cycle per 10 birds. However, the farmer also needs to consider non-economic aspects before making the decision to raise the broiler for another week. These include the presence of a ready market for broilers as well as other factors.

Notes

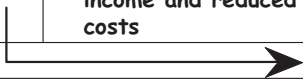
Unit 5.1 – Training exercise 12 Partial budgeting

Task

Suppose a vegetable farmer is considering growing carrots instead of peas. The information available to the farmer is as follows:

Item	\$
Extra income (carrots)	640
Costs saved (peas)	532
Extra costs (carrots)	538
Income not received (peas)	564

Construct a partial budget using the following form

Additional costs (-)	\$	Additional income (+)	\$
Extra costs (carrots)		Extra income (carrots)	
<i>Subtotal</i>		<i>Subtotal</i>	
Income lost (-)	\$	Costs saved (+)	\$
Income not received (peas)		Costs saved (peas)	
<i>Subtotal</i>		<i>Subtotal</i>	
(a) Total additional costs and reduced income		(b) Total additional income and reduced costs	
			
Net change in profit (b - a)			

(Answer key on the opposite page)

Answer key for
Training exercise 12

Additional costs (-)	\$	Additional income (+)	\$
Extra costs (carrots)	538	Extra income (carrots)	640
<i>Subtotal</i>		<i>Subtotal</i>	
Income lost (-)	\$	Costs saved (+)	\$
Income not received (peas)	564	Costs saved (peas)	532
<i>Subtotal</i>		<i>Subtotal</i>	
(a) Total additional costs and reduced income	1102	(b) Total additional income and reduced costs	1172
		→	1102
		Net change in profit (b - a)	+70

Training slides
for Session 5.1.4
Preparing a partial budget

85 Steps in preparing a partial budget

Step 1. State the proposed change

**Step 2. List the added gross income
from the proposed change**

**Step 3. List the reduced costs
from the proposed change**

Step 4. List the added costs

Step 5. List the reduced annual gross income

Step 6. Estimate the net change in profit

Step 7. Consider the non-economic factors

Whole farm plan and budget

This unit defines the whole farm plan and budget, distinguishing it from partial budgeting. It also explains the procedures that can be applied to maximize farm income within the resource constraints of the farmer.

Whole farm planning and budgeting is needed when a major change to the existing farm is being considered – one that will affect most of the cost and income items on the farm. A "partial" change, as we saw in Unit 5.1, can also have significant side effects on the whole farm economy. Changes in the profitability of a single enterprise have ramifications on the profitability of the other farm enterprises. Since most farms are diversified, it is important to know the contribution of particular enterprises to the overall income of the farm. This information and knowledge should ensure better farm management.

Whole farm planning

This session describes the whole farm plan and budget and provides a format that can be used in its preparation. This should provide extension workers and farmers with a greater understanding of how combinations of farm enterprises affect the overall profitability of the farm. The trainees will also be provided with an understanding of the data requirements needed to prepare farm plans.

Objectives

At the end of the session, the participants are expected to:



- understand how to prepare a farm plan;
- understand the changes in the farm (before and after) and implications on resource allocation;
- understand the enterprise combinations and implications that lead to increases in farm income or profit.

Key points

1. A farm plan is an outline of the resources available and the type and volume of production to be carried out.
2. The farm plan requires the following basic data:
 - inventory of resources;
 - potential crops and livestock enterprises;
 - resource requirements per unit of each enterprise;
 - gross margins for planning the enterprise.

3. The farm plan involves five steps:
 - assessment of the plan in physical terms;
 - preparation of enterprise budgets;
 - selection of enterprises;
 - calculation of net farm income;
 - test sensitivity of the plan.
4. The format of a complete farm plan and budget depends on the number and kinds of enterprises involved and the details desired by the planner.
5. A complete farm plan and budget usually contains the following elements:
 - farm inventory;
 - calendar of operations;
 - schedule of expected production and income;
 - schedule of labour requirements;
 - cash flow schedule;
 - summary budget.



Steps for instruction

1. Distribute Handout 5.2.1 (Whole farm planning) to participants before the start of the session.
2. Explain what is meant by a whole farm plan. Initiate a discussion among participants on the use of whole farm planning in practice and the different ways farmers plan their farm. Explain that farm planning aims at combining resources available to the farmer in a way that best achieves the objectives that the farmer sets. Point out that it is usually carried out on an annual basis. Show Slide 86 (What is a farm plan?)

Whole farm planning

A farm plan is an outline of the resources available, the enterprise possibilities and the objectives and goals of the farm family. It should give an assessment of the overall income that can be earned from the selected combination of enterprises.

The plan includes a list of possible enterprises and corresponding levels of production, expected costs and income. This data is brought together into detailed enterprise projections. Consideration is given to market outlets, sources of inputs and materials. The farm plan can also be presented spatially indicating the fields and plots where crops can be grown on the farm and possible cropping rotations to be followed.

When preparing the plan farmers need to take into account the objectives, the possible enterprises that can be grown and the resources that are at their disposal. The plan preparation should include new enterprises that have market potential.

The farm plan requires the following basic data:

- inventory of resources;
- potential crops and livestock enterprises;
- resource requirements per unit of each enterprise;
- list of gross margins for planning the enterprise.

Once a list of potential enterprises and available resources is prepared, it would be possible to select the combination of enterprises that generates a maximum total income for the farm. This would also have to be technically and financially feasible.

*A farm plan
helps to
achieve the
goals of
farm business*

Preparing a farm plan

Step 1

Assess resources available

The plan should first be expressed in physical terms. An assessment will be needed of the resources available to the farmer and the area of each crop and number of each type of livestock available. This also involves identifying the potential crops that can be grown from the farmer's resource base.

Step 2

Prepare budgets for the different farm enterprises

The enterprise budgets or gross margins are brought to a per unit basis for comparisons to be made. The range of farm enterprises should include new enterprises identified through the market plan. The farmer should also take into account the decision as to whether to specialize in a few enterprises, or alternatively, to diversify production and spread risks. Supplementary enterprises, such as small-scale livestock, can also be included especially if they are held around the homestead and do not compete for scarce resources. These enterprises will add to the overall farm profit or income.

Step 3

Use the enterprise budgets to determine which of the alternative crops and livestock enterprises would yield the highest gross margin

This is done while considering the constraints of the limited supplies of labour and sometimes capital. While farmers have a number of resources under their management control, there may be one or two resources that are really in short supply and prevent the farmer from expanding income on the farm. These are called the "most limiting resource", on production. Ways are used to identify which resource it is. Once the limiting

resource is found, the problem facing the farmer is to know how much of an enterprise to produce and with what resources in order to increase profits. Farm enterprises would then be selected in order from that generating the highest gross margin per unit of limiting resource to the lowest. A selected enterprise would be expanded until the limiting resource is all used up.

A problem often encountered is to find which resource it is that is the most limiting. The farmers' judgement is needed to assess this. Farmers are the most likely persons to know. Most often land is treated as the limiting resource and planning is conducted on the basis of gross margin per hectare but this may not always be suitable, especially among small farms in Asia where family labour is often in scarce supply. The limiting resource often depends on local circumstances.

Step 4

Estimate the total net income for the farm

The farm plan is initially constructed on the basis of gross margin data expressed as a unit of land or head of livestock. In order to estimate the net farm income, the total gross margin generated from the farm plan must take into account the fixed costs. This shows the profitability of the farm as a whole. In economic terms it is defined as the reward for all the resources contributed by the farm family during the year. Whole farm income is necessary to cover the family living expenses.

Note: The whole farm income is not the same as the cash the farm family earns. To know precisely the amount of cash available, the costs related to family labour, depreciation and interest must be deducted from the farm income.

Training slides
for Session 5.2.1
Whole farm planning

86 What is a farm plan?

An outline of resources available, enterprise possibilities, objectives and goals of the farm family

It includes a list of possible enterprises and levels of production, expected costs and income brought together in detailed enterprise projections

Consideration should be given to market outlets, sources of inputs and materials

The farm plan can also be presented spatially showing fields and plots of enterprises and their rotation

87 Preparing a whole farm plan and budget

- Step 1. Assess resources available, the area of each crop and numbers of available livestock. Identify also the potential crops that can be grown on farm from the farm resource base**
- Step 2. Prepare budgets for the different enterprises that can be produced**
- Step 3. Determine which crops and livestock enterprises would yield the highest gross margin**
- Step 4. Estimate the total net income for the farm**
- Step 5. Test sensitivity of the plan for key variables**

Module 5, Unit 5.2, Session 5.2.1

88 The planning format

A complete plan and budget usually contains the following elements ...

**Farm inventory
Calendar of operations
Schedule of expected production and income
Schedule of labour requirements
Cash flow schedule
Summary budget**

The format of a complete plan and budget is more flexible than partial budgets and depends on the number and kind of enterprises involved and the details desired by the planner

Module 5, Unit 5.2, Session 5.2.1

Maximizing farm income using available resources

This session presents an example of how farm income can be maximized with the use of available resources, by way of preparing a farm plan and budget. The step-by-step procedure described in the previous session is applied to solve an example problem.

Because the concept is something new to both the farmer and the extension worker, the use of this illustrative example should greatly facilitate understanding of the farm planning process.

Objectives



At the end of the session, the participants are expected to know how to prepare a whole farm plan and budget.

Key points

1. The basic objective of a farmer is to maximize farm income given the available resources. This is done by choosing the most profitable combination of enterprises suitable for the farm along with the most appropriate resource allocation.
2. A simplified programming technique can be applied to a farm with few enterprises and limited resources.

3. The steps involved are listed as follows:

- Determine the resources available and required for each activity. These could be: (i) land; (ii) capital, such as cash on hand; (iii) family and hired labour.
- Select the activity with the highest gross margin and consider its resource requirements.
- Select the activity with the second highest gross margin and allocate the remaining resources in line with the activity requirements.
- Work through the same process for the next activity until all the resources are fully utilized.
- Calculate the gross margin for each activity or enterprise to find the total income for the whole farm.

4. Whole farm budget analysis does not follow strict rules, but it can become complicated when additional resource constraints and activities are included.

Note: Computer packages, such as linear programming, are available for optimization of income or minimization of cost of resources given the resource constraints.

Steps for instruction



1. Distribute Handout 5.2.2 (Maximizing farm income using available resources) to participants before the start of the session.
2. Explain that the farmer should choose the most profitable combination of enterprises for the farm along with the most appropriate resource allocation. Show Slide 89a (Farm plan), Slide 89b (Budgeted gross margin by enterprise), Slide 89c (Budgeted gross margin by resource requirements).

Maximizing farm income using available resources

An important objective of farmers is to optimize farm income given the available resources. For this, the farmer should choose the most profitable combination of enterprises suitable for the farm along with the most appropriate resource allocation. The budgeted gross margin below involves few enterprises and limited resources, which as such can be resolved using a simple farm planning technique as shown.

Budgeted gross margin by enterprise
(applying a simple farm technique)

Enterprise	Example				
	Yield (mt/ha)	Gross income (\$)	Cash variable costs (\$)	Total variable costs (\$)	Gross margin (\$)
Rice	2.8	4 500	1 273	2 173	2 327
Cauliflower	15.0	12 000	2 974	4 454	7 546
Cabbage	25.0	10 000	2 982	4 482	5 518

Gathering basic information for a farm plan

Step 1

Determine the resource availability and requirement

- **Land availability.** The average landholding in Asia is assumed to be 0.76 hectare, so in our example a model farmer operates 0.76 hectare of lowland irrigated area.
- **Capital.** The farmer has cash in hand amounting to \$1 600 for crops grown in the summer season.
- **Labour.** The farmer has two full-time adult family members. The farmer hires labour on a daily basis at \$12 per day.

Budgeted gross margin by resource requirement

Resource	Available	Per hectare resource requirement for each crop		
		Rice	Cauliflower	Cabbage
(1)	(2)	(3)	(4)	(5)
Rice land	0.76 ha	1		
Cauliflower land	0.40 ha		1	
Cabbage land	0.40 ha			1
Labour availability requirements in September	30 days	28	50	50
Cash available/requirements (\$)	1 600	1 273	2 974	2 982
Gross margin per ha (\$)		2 327	7 546	5 518

Land available for rice is 0.76 ha. The available land for cauliflower and cabbage is 0.40 ha.

The labour requirements for each crop is estimated and given in the table above. The total available family labour is 30 days in September. The cash requirements available to the farmer are also shown above.

With this information on the requirements and availability of resources such as land, labour and capital resources, the question is "How can the resources be allocated in a way that profit can be maximized?"

Step 2
Obtain the crops with the highest gross margin

As can be seen, cauliflower has the highest gross margin. The area allocated for cauliflower is 0.40 ha. out of a possible 0.76 ha. To determine the family labour needed to cultivate cauliflower, the labour requirement of 50 person-days is multiplied by the area of land allocated to that crop (0.40 ha). Why is this so? Simply, that resource requirements are estimated on a per hectare basis. Thus, the family labour required for 0.40 ha is 20 days of the 30 days available. This leaves a remaining 10 days.

We now consider the crop with the second highest gross margin. In this case it is cabbage. Because all the 0.40 ha. suitable for vegetable cultivation has already been allocated to cauliflower, it is not possible for cabbage to be grown. There is insufficient land available. The remaining 0.36 ha. of land therefore, can only be planted with rice. The remaining 10 days of family labour, which is the required labour for 0.36 ha rice, can be fully utilized.

In order to calculate the capital needed to grow cauliflower, the 0.4 hectares is multiplied by a cash requirement of \$2 974. The sum (\$1 189) is deducted from the cash available to the farmer (\$1 600) leaving \$411. We cannot grow cabbage because of the limits of cash. Because we have only \$411 left, this can be allocated to rice but the area of land under the crop will need to be cut back to 0.32 ha ($\$411 \div 1\,273$). The combination of cauliflower and rice generates the highest income compared to alternatives, or \$3 018 ($7\,546 \times 0.40$) from cauliflower and \$744 ($\$2\,327 \times 0.32$) from rice. This generates a total farm income of \$3 764.

From this example, it is clear that budget analysis does not follow strict rules. It is quite simple but could be a little tedious if more resource constraints and activities exist.

Unit 5.2 – Training exercise 13 Whole farm budget

A farmer has 1.0 hectare of land that could all be planted with rice. The land could also be used to grow tomatoes on 0.40 hectares and eggplant on 0.60 hectares. Cash available here is \$3 000 and there are 40 person-days of labour for disposal. The resource requirements by the different enterprises and the gross margin per hectare are also indicated.

Resource	Available	Resource requirement		
		Rice	Tomatoes	Eggplant
Rice land (ha)	1.00	1.00		
Tomatoes land (ha)	0.40		1.00	
Eggplant land (ha)	0.60			1.00
Labour (person-days)	40	25	50	40
Cash on hand	\$3 000	1 500	4 000	3 000
Gross margin per ha		\$1 000	\$7 500	\$5 500

Task

Given the data above, fill out the form below showing the allocation of resources to maximize net farm income.

Enterprise	Land (ha)	Labour (person-days)	Capital (\$)	Gross margin (\$)
Tomatoes				
Eggplant				

Total

(Answer key on the opposite page)

Answer key for
Training exercise 13

Enterprise	Land (ha)	Labour (person-days)	Capital (\$)	Gross margin (\$)
Tomatoes	0.40	20	1 600	3 000
Eggplant	0.47	19	1 400	2 585
			Total	5 585

Training slides
for Session 5.2.2
Maximizing farm income using available resources

89a Farm plan

The basic objective of the farmer
is to optimize farm income
given available resources

The farmer needs to choose
the most profitable combination of enterprises,
along with the most appropriate resource allocation
for preparing the farm plan

Slides 89b and 89c show examples

89b Budgeted gross margin by enterprise

This example involves selected enterprises and limited resources

Enterprise	Yield	Gross income	Cash variable costs	Total variable costs	Gross margin
	(mt/ha)	(\$)	(\$)	(\$)	(\$)
Rice	2.8	4 500	1 273	2 173	2 327
Cauliflower	15.0	12 000	2 974	4 454	7 546
Cabbage	25.0	10 000	2 982	4 482	5 518

(continue to Slide 89c)

Module 5, Unit 5.2, Session 5.2.2

89c Budgeted gross margin by resource requirements

This example shows resource availability for selected enterprises

Resource	Available	Per hectare resource requirement for each crop		
		Rice	Cauliflower	Cabbage
(1)	(2)	(3)	(4)	(5)
Rice land	0.76 ha	1		
Cauliflower land	0.40 ha		1	
Cabbage land	0.40 ha			1
Labour availability requirements in September	30 days	28	50	50
Cash available/requirements (\$)	1 600	1 273	2 974	2 982
Gross margin per ha (\$)		2 327	7 546	5 518

Module 5, Unit 5.2, Session 5.2.2

Labour planning

This unit looks at the importance of labour planning in farm planning. There is often insufficient full-time labour available on a farm to cover all necessary work. If there is full-time labour available, it often includes periods of excess labour, depending on the specific labour needs of the farming system. Farming by nature implies that labour is irregular. There can be periods of excess labour supply and periods of shortage of labour.

Labour can be a major cost contributor to farm production and output, hence labour has to be planned carefully. In planning for labour it is necessary to consider the peaks and troughs of seasonal labour availability in relation to farm labour requirements. This understanding and knowledge should ensure better management and more profitable farming.

Planning farm labour

The use of labour planning in farm planning serves as a tool to allocate labour on the farm and make best use of its full potential.

The availability of labour on the farm is irregular and there are times when there is an excess of supply and other times when there are shortages. More often than not, farms in a particular area follow the same calendar of operations and, therefore, have the same high and low demands for labour. Labour planning helps farmers anticipate incoming labour supply problems and enables them to lessen the effects of shortfalls in supply.

Objectives

At the end of this unit, the participants should be able to:



- understand the importance of labour planning for the farm;
- prepare a labour profile for the farm;
- use labour planning as a tool to assess the effects of changes involving several enterprises within the farm.

Key points

1. Any change in farm activities will require the farmer to check the labour resources and demands.
2. Many farms do not have sufficient family labour to cover all the demands throughout the year.
3. It is necessary to consider the highs and lows of seasonal labour availability in relation to the farm labour requirements.

4. A labour profile shows the seasonal labour requirements of each farm enterprise and the total demand of all enterprises for each month of the year.
5. The procedure for preparing and using a labour profile is as follows:
 - Calculate the person-days required for each enterprise.
 - Calculate the monthly requirements in person-days for each enterprise.
 - Construct a labour profile for all farm enterprises together.
 - Assess the person-days available to the farmer from the family labour supply.
 - Examine the labour supply and demand profiles and formulate a strategy for dealing with labour shortfalls and surpluses.
6. The labour profile should be evaluated and conclusions drawn as to how best to improve labour efficiency.

Steps for instruction



1. Distribute Handout 5.3.1 (Planning farm labour) to the participants before the start of the session.
2. Explain the purpose of labour planning. Mention that any change in the farm activities will require an assessment of labour demand and supply. Show Slide 90 (Planning farm labour).
3. Open a discussion with the participants on the usefulness and relevance of labour planning. The participants should be encouraged to talk about their field experiences.

Planning farm labour

Labour costs are often a high percentage of the total production costs. It is essential therefore to plan carefully the use of family and hired labour. More efficient use of labour can be planned at two levels: (i) the individual enterprise; (ii) the whole farm. At the individual enterprise level, labour planning is used to improve the performance of the different operations associated with the enterprise. Here the problems are essentially practical and deal with the way operations are conducted.

At the whole farm level, the best use of labour throughout the year is assessed. These two levels, however, are closely linked. Any change in the type of farm enterprises selected and farm operations requires farmers to examine the labour resources and requirements. Labour requirements in peak periods (e.g. transplanting, weeding, harvesting) could be met partially through the employment of part-time or casual labour.

There is often insufficient full-time labour to cover all the labour demands on the farm throughout the year. If it does, it is likely to have excess labour at other times. It is necessary to consider the peaks and troughs of seasonal labour availability in relation to the farm labour requirements. To do so, it is necessary to calculate the labour requirements for the different crops and livestock within the farm.

In planning the use of labour on the farm over a season, labour profiles are drawn up. The labour profile shows graphically the seasonal labour requirements of each enterprise and the total demand of all enterprises for each month of the year. Many farm operations are carried out by women, thus labour profiles could be disaggregated and broken down by gender.

Labour forms a large part of farm costs and should be planned carefully

Preparing and using a labour profile

- Calculate the person-days required for each enterprise (see diagram opposite).
- Calculate the monthly requirements in person-days for each enterprise (see diagram opposite).
- Construct a labour profile for all farm enterprises together, as shown in the diagram opposite.
- Assess the person-days available to the farmer from the family labour supply.
- Examine the labour supply and demand profiles and formulate a strategy for dealing with labour shortfalls and surpluses.

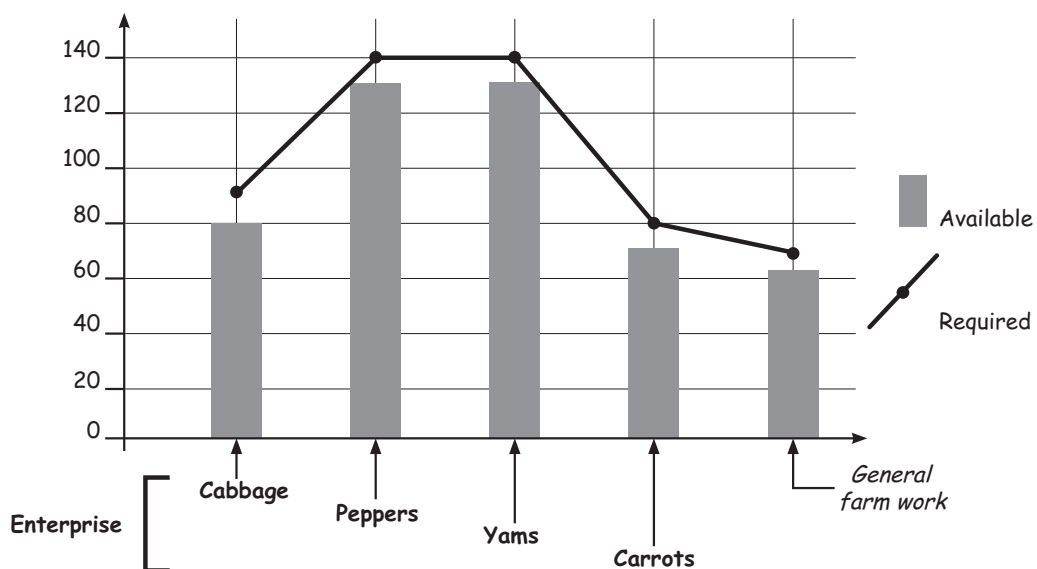
It is necessary to consider the peaks and troughs of seasonal labour availability in relation to the farm labour requirements. By modifying the cropping pattern and making changes to the enterprise operations it is possible to achieve a better allocation of labour and ensure its more efficient use. Periods of low supply may be used for conducting more general farm maintenance operations. And, as noted above, labour requirements during high periods of demand (e.g. transplanting, weeding or harvesting period) could be met through the employment of either part-time or casual labour or alternatively through the introduction of more efficient use of labour or the introduction of mechanization.

Enterprise	Available person-days	Required person-days
Cabbage	80	90
Peppers	130	140
Yams	130	140
Carrots	70	80
General farm work	62	68
Total	472	518

Person-day requirements for some agricultural enterprises by small farmers in Asia

Enterprise	Labour availability (person-days per ha or head)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Cabbage	80	0	0	3	5	0	0	0	18	24	25	4	0
Pineapple	120	0	0	4	8	0	0	28	37	24	13	7	0
Peppers	130	0	0	4	9	0	0	30	40	33	8	7	0
Yams	130	0	0	40	0	4	0	0	32	33	5	12	5
Carrots	70	0	0	19	2	2	0	0	26	9	3	6	3
Chili	240	0	0	74	0	0	0	0	72	54	10	21	10
Sweet potato	120	0	0	11	22	3	6	6	1	12	45	14	2
Ginger	120	0	0	6	0	90	18	3	3	0	0	0	0
Sugar cane	120	11	11	11	10	9	9	9	9	9	10	11	11
Dairy cows	60	5	5	5	5	5	5	5	5	5	5	5	5
Beef cattle	45	4	4	4	4	3	3	3	4	4	4	4	4
Total		20	20	181	65	116	41	84	247	207	128	91	40
<i>Gen. farm work (approx. 15%)</i>		3	3	27	10	17	6	13	37	31	19	14	6
General total		23	23	208	75	133	47	97	284	238	147	105	46

Diagram of a labour profile



Unit 5.3 – Training exercise 14 Preparing a labour profile

Background

	Labour requirements (person/day/hectare)				Total month	Availability month (*)	Surplus (+) Deficit (-)
	Vegetables	Yams	Cabbages	Hot pepper			
Jan	2	25	10	0	37	50	13
Feb	5	20	10	15	50	45	-5
Mar	5	30	5	30	70	45	-25
Apr	5	10	5	30	50	45	-5
May	3	5	10	35	53	45	-8
Jun	3	15	0	30	48	45	-3
Jul	0	15	0	30	45	45	0
Aug	0	0	0	35	35	45	10
Sept	0	25	0	25	50	45	-5
Oct	0	5	0	30	35	50	15
Nov	5	5	0	0	10	50	40
Dec	5	5	0	0	10	50	40
Total	33	160	40	260	493	560	

(*) Labour availability = 2 adults (one works full time and the other only 50%)

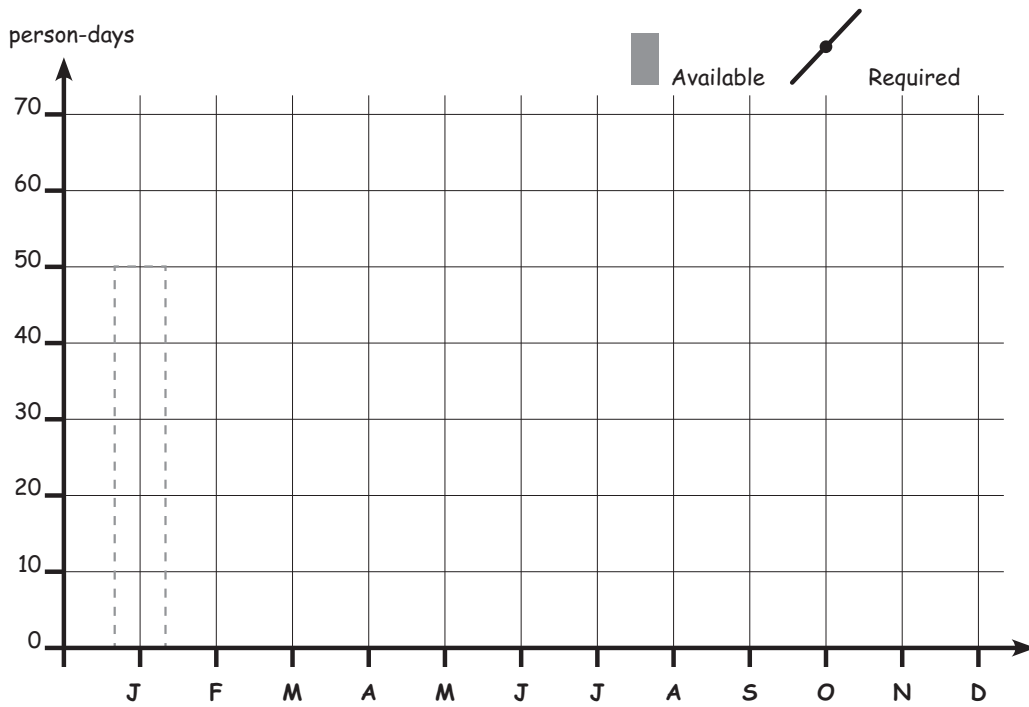
Task

Given the monthly labour requirements and labour availability set out in the table above, prepare a labour profile for an Asian farm. The farm consists of 5 ha with 0.5 ha of vegetables, 2.0 ha of yams, 0.5 ha of cabbages and 2.0 ha of hot pepper.

(continued on the next page)

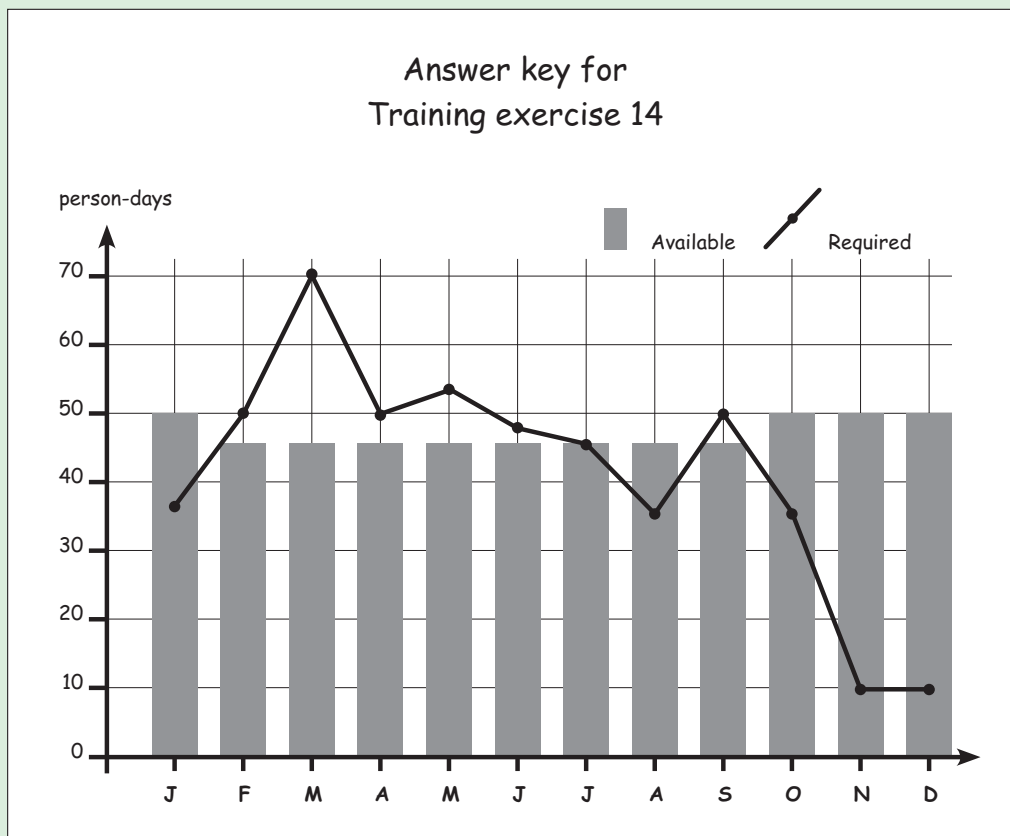
Training exercise 14 (continued)

Illustrate graphically a labour profile



Comment on how you will cope with any peak labour requirements

(Answer key on the following page)



Training slides
for Session 5.3.1
Planning farm labour

90 Planning farm labour

**Labour costs are often a high percentage
of total production costs**

**Efficient use of labour can be planned on two levels ...
enterprise and whole farm**

**Farms rarely carry sufficient full time labour
to cover all demands throughout the year ...
if so, they are likely to have excess labour at other times**

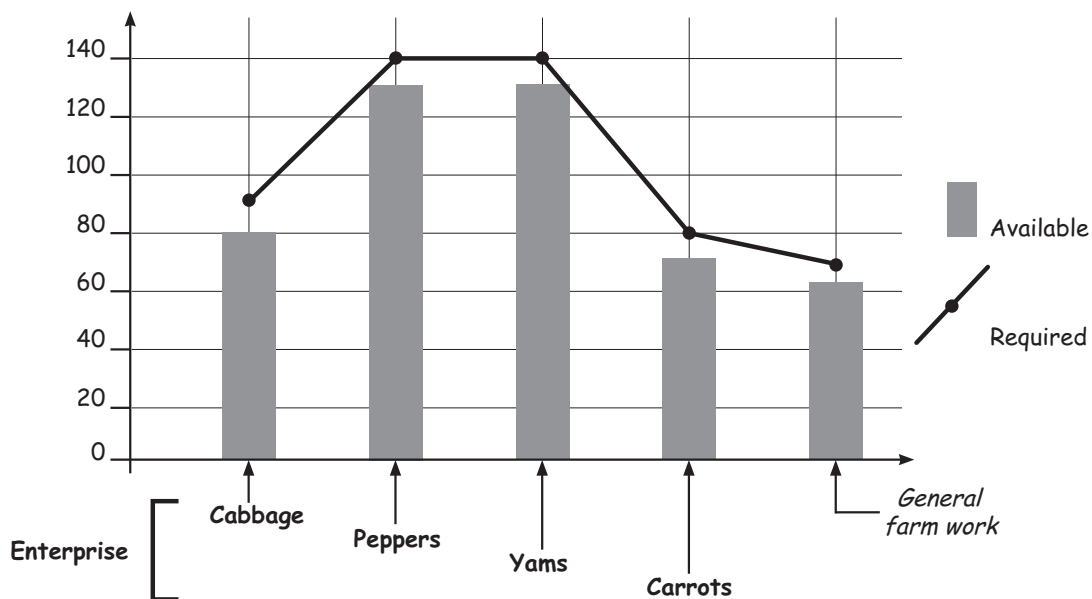
**It is necessary to consider peaks and troughs in seasonal
labour availability in relation to farm labour requirements**

91a Preparing and using a labour profile

1. Calculate the person-days required for each enterprise.
2. Calculate the monthly requirements in person-days for each enterprise.
3. Construct a labour profile for all farm enterprises together (see Slide 91b).
4. Assess the person-days available to the farmer from the family labour supply.
5. Examine the labour supply and demand profiles, formulate a strategy for dealing with labour shortfalls and surpluses.

Module 5, Unit 5.3, Session 5.3.1

91b Diagram of a labour profile



Module 5, Unit 5.3, Session 5.3.1

Cash flow

This unit introduces the use of cash flow for farm planning and analysis. One of the most important factors that affect the farm business is the availability of money to run day to day farm operations. Farmers often experience difficulty in financing their activities by themselves and sometimes have to use loans. Cash flow is used to assess whether the farmer has enough money to carry out the farm plan in part or in its entirety and the financial requirements that are needed.

The concept of cash flow

This session discusses the concept of cash flow and liquidity. Cash inflow and outflow are discussed as well as ways to improve cash flow performance.

Farm management decisions are determined largely by the cash position of the farm household. Cash flow analysis examines the ability of the farm household to meet its financial obligations through its enterprises and other sources of income, and it provides solutions to generate sufficient cash. This determines its liquidity status. It also shows the period in the year when the farm household has adequate cash to cover costs and the months when the farm household has a cash deficit.

Understanding the concept of cash flow will enable both the farmer and the extension worker to realize when enterprise profitability is insufficient and to assess whether a change in farm activities is required. Cash flow is a tool to determine whether adequate funds are available within the farm business or will have to be acquired from outside sources.

Objectives

At the end of this session, the participants will:



- understand the concepts of cash flow and liquidity;
- understand the importance of cash flow in planning and analysis of the farm;
- understand the purpose of the tool.

Key points

1. Cash flow is the flow of money into the farm from sales and the flow of money out of the farm from purchases.
2. For a farm to continue to operate in the medium to long term, it must generate a positive cash flow.
3. Cash flow is a tool with applications for both ongoing analysis and forward planning of a farm.
4. Cash flow can be used:
 - to monitor liquidity;
 - for farm planning and management;
 - to provide solutions to cash shortfalls.
5. An important management task is to control the cash flow in and out of the farm.
6. Liquidity is the ability of the farmer to generate enough cash to meet financial obligations without disrupting the normal operation of the farm.
7. The following factors affect the liquidity of the farm:
 - length of the production cycle;
 - timing and schedule of crop sales throughout the year;
 - ability of buyers to pay farmers in time for produce sold.

8. Cash inflows may come from:

- sales of crop, livestock and livestock products;
- other sources of farm income;
- sales of capital assets;
- borrowed money.

9. Cash outflows may be in the form of:

- production costs;
- capital expenditures;
- loan payments;
- family living expenditures.

10. The availability of cash is often more important than generating profits.

Steps for instruction



1. Distribute Handout 5.4.1 (The concept of cash flow) before the start of the session.

2. Show Slide 92 (Cash flow) and explain its value.

Show Slide 93 (Calculating cash flow) and define it as the flow of money into the farm from sales and the flow of money out of the farm from purchases. Explain that net cash flow is the difference between the inflow and outflow of cash.

3. Explain the use of cash flow with the aid of Slide 94 (Cash flow analysis), pointing out that for a farm to continue to operate in the medium to long term it must generate a positive cash flow.

The concept of cash flow

Gross margins and enterprise budgets show the profitability of a farm enterprise. This indicates the contribution that new, profitable enterprises can make to the overall farm income. But when a new farm enterprise is introduced into the farming system a cash flow should also be prepared to check if the farm enterprise generates enough income to cover its expenses. The cash flow is also needed to look at the overall effect of these changes on the financial situation of the farm and farm household as a whole.

Cash flow is of particular interest to farmers. It guides them in assessing whether they have enough money to carry out the plan or are likely to be short of money in any month. It enables the farmer to see when, during the year, additional financial resources may be required.

The cash flow is simply the flow of money into the farm from sales and the flow of money out of the farm in the form of purchases. The difference between the inflows and outflows is known as net cash flow.

$$\text{Net cash flow} = \text{Cash inflows} - \text{Cash outflows}$$

Farmers should try to generate a positive cash flow by ensuring that more cash flows into the farm than out of the farm.

Cash flow analysis

Cash flow budgets are important in:

- planning the farm;
- choosing between alternative farm enterprises;
- comparing actual and budgeted results and enabling corrective action to be taken on time;
- arranging for loans.

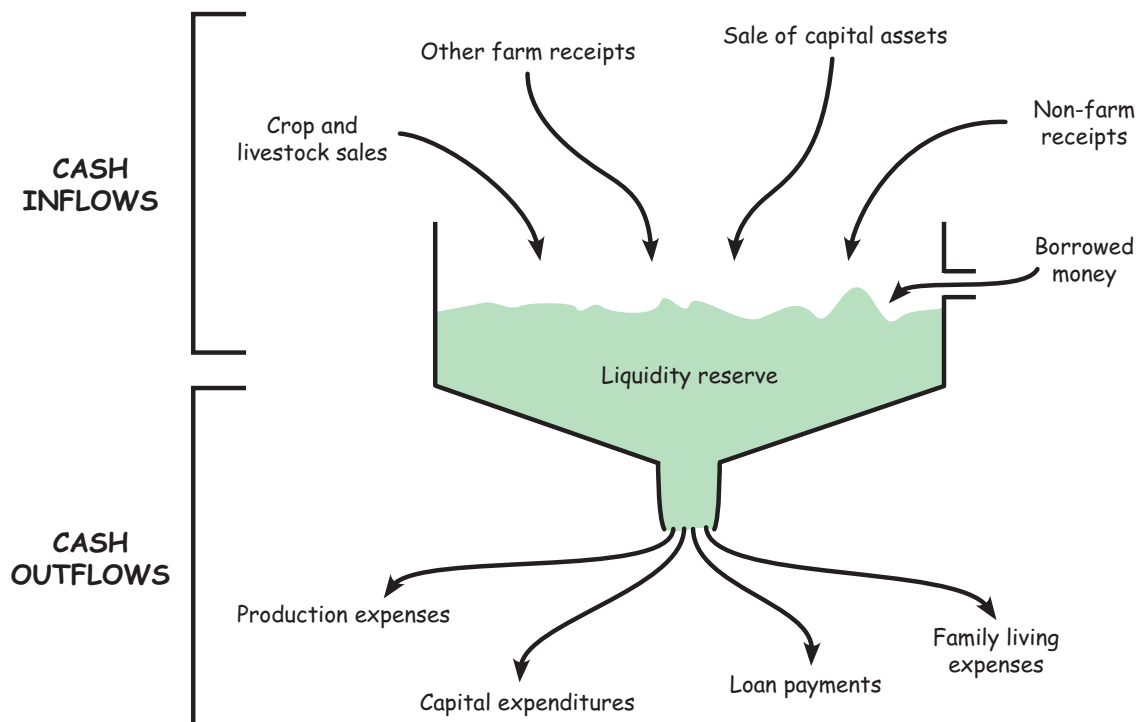
Cash flow is used to check if the farm has enough cash to cover expenses

Cash transactions frequently occur. An important task of the farmer as manager is to control this flow of cash in and out of the farm. Cash flow is used to examine whether the financing is available within the farm household, or whether there is a need to take out a loan. If a farmer decides to take a loan, the cash flow will also indicate whether the farmer is able to repay the interest and debt.

Liquidity

Liquidity is the ability of the farmer to generate enough cash to meet financial obligations as they come due without disrupting the normal operation of the farm. This concept is illustrated below.

The flow of cash into and out of the liquidity reserve



As the diagram shows, cash flows into the farm from various sources such as the sales of crops and livestock, the sales of capital assets, mobilization of loans and non-farm income sources. Farmers use this money to cover their farm and family expenses. These include such items as production costs, capital expenditures, loan repayments and family living expenses. A reserve of cash or liquidity needs to be kept to prevent cash shortages from disrupting the normal farm operations. Several factors can affect the liquidity position of the farm:

- The farm production cycle for most enterprises lasts at least a year. This means that farmers often have to make payments for inputs and materials used for up to a year before any produce is sold.
- Farmers often find that it may be better not to sell produce directly following harvest, but alternatively to store the crop for some time in the search for higher prices. This, however, has an effect on the cash reserve by delaying cash inflows from product sales.
- Very often traders involved in purchasing farm produce do not pay for it immediately.

For many farmers the availability of cash over the short term may even be more important than generating additional profits. For example, farmers may sell some of their productive assets, such as livestock, in order to pay for seeds and fertilizers. For these reasons farmers need access to working capital and short-term credit. Flexible lending facilities are often required to advance cash as is needed during the production cycle and can be repaid when produce is sold.

Cash inflows

Sales of crop and livestock products are the primary sources of cash for the farm and are critical to maintain the farm's liquidity reserve. Some enterprises, such as dairy cows, generate a relatively even flow of cash over the production year. Other enterprises, such as fruit and livestock (meat production), result in irregular cash inflows over the production period.

Other farm income sources sometimes constitute a substantial cash inflow to the farm. A typical item includes income generated from work performed for other farmers.

Non-farm income sources include income from off-farm employment, cash inflows from savings, interest earned on investments and financial gifts.

Sales of capital assets are irregular inflows of cash from the sale of land, buildings, machinery, livestock and other capital items.

Borrowed money is also a source of cash. It enters the cash reserve from the side rather than the top because it is often considered a source of cash used to maintain liquidity when cash outflows exceed inflows. Borrowed money takes the form of short-term loans to cover operating costs and longer-term loans for the purchase of assets such as machinery, livestock and buildings.

Cash outflows

Production costs constitute a relatively large draw on the liquidity reserve. These costs include seed, fertilizer, pesticides, feed, hired labour and repairs. If a farmer fails to maintain a liquidity reserve to meet these costs, farm production could immediately drop, and the farmer could end up paying a high level of interest on borrowed money.

Training slides
for Session 5.4.1
The concept of cash flow

92 Cash flow

When a new enterprise is introduced into the farming system a cash flow should be prepared to assess whether the enterprise generates enough income to cover expenditures

It is also necessary to assess the overall effect of the change in the farm enterprise on the finances of the farm household as a whole

Cash flow is of particular interest to farmers for it allows them to see when, during the year, additional financial resources may be required

93 Calculating cash flow

Cash flow is simply the flow of money into the farm from sales and the flow of money out in the form of purchases.

The difference between the inflows and outflows is known as net cash flow ...

Net cash flow = Cash inflows - Cash outflows

Farmers should try to generate a positive cash flow by ensuring that more cash flows into the farm than out of the farm

Module 5, Unit 5.4, Session 5.4.1

94 Cash flow analysis

Cash flow budgets are important and are used in ...

Planning the farm

Choosing between alternative farm enterprises

Comparing actual and budgeted results and enabling corrective action to be taken on time

Arranging for loans

An important task of the farmer as a manager is to control the flow of cash in and out of the farm

Module 5, Unit 5.4, Session 5.4.1

Application of cash flow

This session examines the use of cash flow in farm planning and as a tool for evaluating the financial performance of the farm as a whole. The cash flow guides decision-makers in assessing whether the farm is able to generate a cash surplus or incur a cash deficit and the time of the year when additional financial resources may be required. Ways for improving cash flow performance are discussed.

Knowing the possible applications of cash flow is useful for farmers and extension workers to better manage the financial situation of the farm and make more informed financial decisions. Knowledge of possible solutions to liquidity problems are sure to improve the performance of the farm business.

Objectives



At the end of this session, participants are expected to:

- understand the many uses and advantages of analysing the farm's cash flow;
- know the cash flow problems usually encountered on a farm and know how to go about addressing them.

Key points

1. The projected cash flow is completed at the beginning of the accounting period. Estimates are made of the expected cash inflows and outflows. The cash flow is used to estimate the liquidity reserve or cash balance for each month.
2. The farmer needs to find answers to the following: (i) How much money are the farm enterprises likely to generate, and how much will they cost? (ii) When will money be received, and when will money be needed? (iii) If the amount of money expected to be received over the year does not cover the amount needed, how can the farmer make up the difference? (iv) Can it be made up by savings? (v) Does the farmer have the reserves? (vi) Does the farmer have access to loans?

3. The steps involved in preparing the cash flow are:

- list the sales and expenditure items when they occur in the year;
- prepare a cash flow table;
- calculate the net cash flow;
- calculate the cumulative net cash flow;
- analyse the net cash flow.

4. The cash flow is used:

- to monitor liquidity;
- for farm planning and management;
- to provide solutions to cash shortfalls.

Steps for instruction



1. Distribute Handout 5.4.2 (Application of cash flow) to the participants before the start of the session.
2. Ask the participants to suggest uses of cash flow and list them on a posterboard. Make sure the points raised include: (i) How much money is likely to be generated from the farm enterprises and at what cost? (ii) When will the money be received, and when will it be needed? (iii) If the money received does not cover the expenses, how can the difference be made up?
3. Explain with the aid of examples the different uses of the cash flow. These might include to monitor liquidity, for farm planning and management, and to provide solutions to cash shortfalls. Brainstorm with the participants on some of the typical cash flow problems and solutions that they have experienced. Discuss the issues and draw up a list of possible solutions. Refer to Handout 5.4.2 as a source of reference.

Application of cash flow

The main feature of a cash flow is that it focuses specifically on cash. The non-cash items included in gross margin analysis are taken out. Items such as depreciation, the value of family labour and food consumed at home are omitted. The cash flow is prepared to include all income and expenditures for the farm household in the months in which they occur. It could include loans that the farm household receives from moneylenders, friends and lending institutions as cash inflows, and also the repayment of these loans (principal and interest) as cash outflows.

Constructing a cash flow. A cash flow can be constructed on what the farmer is currently doing. It can also be drawn up on the basis of what the farmer intends to do over the next year. Farm management extension workers and farmers often find it useful to calculate cash flows on a monthly or quarterly basis although annual cash flows are also common for long-term investments. In this session cash flow is calculated on a monthly basis for a farm year.

Example

A farm household earns some income from selling rice and maize and keeping dairy cows. Three farm children attend school. The farmer wishes to introduce French beans and knows that this enterprise is profitable.

The question facing the farmer is whether there are enough funds to finance the enterprise. Answers are needed to the following questions: (i) How much money are the farm enterprises likely to generate and how much will they cost? (ii) When will money be received and when will it be needed? (iii) If the amount of money expected to be received over the year does not cover the amount needed, how can the farmer make up the difference? (iv) Will it be made up by savings? (v) Does the farmer have reserves? (vi) Does the farmer have access to loans?

Using this example, the steps involved in preparing the cash flow are shown on the following pages.

Step 1

List sales and expenditure items when they occur
(a list of cash inflow and outflow figures are provided below)

Cash inflow			Cash outflow		
Description	Month	Income (\$)	Description	Month	Expenditure (\$)
Sales of rice	Sep	300	Money spent on farm inputs	Mar	350
	Jan	250		Sep	410
Sales of maize	Aug	120	Money spent on farm inputs	Apr	250
Sales of milk	Mar-Sep	420	Money spent on farm inputs	Jan-Dec	1 960
Sales of chicken	Jan	130	Brooding cost and feeding	Sep	60
			Money to cover living expenses	Jan-Dec	720
Planned sale of French beans	July	450	Money spent on inputs	Apr	250
	Dec	400		Jul	90
				Oct	210
				Dec	70
			Money to cover school expenses	Feb	240
				Apr	140
				Sep	100
			Money to cover health expenses	Jan-Dec	240

Step 2

Prepare a cash flow budget

From this list we can work out the monthly balance. This can be done by entering all of the information in a cash flow budget form as shown on the opposite page.

Table 5.1 — Cash flow budget

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Cash reserves	25											
<i>Money coming in</i>												
Sales of farm products												
Rice	250		300	100	100	50			300	100	100	
Maize				220				120				
Milk	60	60	60	60	60	60	60	60	60	60	60	60
Chicken	130								60			
Planned sale of beans							450					400
Total cash inflow	465	60	360	380	160	110	510	180	420	160	160	460
<i>Money going out</i>												
Purchase of inputs												
Rice			300						300			
Maize					320							
Farm inputs livestock	30	50	50	50	50	50	50	50	50	30	30	30
Chicken feeding expenses									60			
French beans				200			40			180		40
<i>Household expenses</i>												
School fees		240		140					100			
Hospital expenses	20	20	20	20	20	20	20	20	20	20	20	20
Total cash out-flow	50	310	370	410	390	70	110	70	530	230	50	90
Monthly net cash flow	415	-250	-10	-30	-230	40	400	110	-110	-70	110	370
Cumulative balance	415	165	155	125	-105	-65	335	445	335	265	375	745

Step 3**Calculate the net cash flow**

This is simply done by subtracting the expenses from the income for each month. It will be positive if income is greater than expenses and negative if income is less than expenses.

Step 4**Calculate the cumulative net cash flow**

In order to assess whether the family has enough cash over the year to cover the introduction of beans, a cumulative cash flow needs to be prepared.

Step 5**Analyse the net cash flow**

This example shows that the family has a shortfall of cash in May. This means that even though beans is a profitable enterprise the family does not have the money available to cover the expenditures expected to occur in that month. What can the family do?

- The farmer could decide not to introduce French beans.
- Or the farmer could try to save some money in order to cover the financial "deficit".
- The farmer might decide to cut back on some of the inputs used for growing beans.
- The farmer might decide to reduce some of the area under maize and rice in order to reduce costs.
- The farmer might sell some of the livestock to cover the financial gap.
- The farmer might decide to take a loan to cover the shortfall.

Uses of cash flow

Farmers should be aware of the cash flow situation of the farm. This is necessary to ensure that cash is available to cover expenses when needed. Ways in which cash flow can be used are discussed below.

To monitor liquidity. The cash flow records the timing and size of the cash inflows and outflows that occur over a given period, normally a year. The year is broken down into shorter periods of months or quarters. Actual cash flows could be compared with projected cash flow as a way of monitoring the plan, devising solutions to problems and taking advantage of opportunities that occur.

For farm planning and management. The actual cash flow is compared with the projected cash flow to improve the performance of the farm. The actual cash flow from one year can be used to project the cash flow for the next year. In this way farmers will know that they have cash reserves available and will not be surprised by cash shortfalls.

Projecting a cash flow is sometimes difficult. Crop and livestock budgets are useful in providing necessary information for projecting future cash flows. The farmer should also anticipate the changes in farm operations that are expected to take place the coming year, such as the introduction of crop rotations, new livestock enterprises or sales and purchases of capital assets.

To provide solutions to cash shortfalls. An important function of the cash flow is to identify cash shortfalls and ways of addressing the problem. This might be done by borrowing additional funds, using savings or selling assets.

Table 5.2 on the next page illustrates situations where cash problems occur and provides possible solutions or suggestions for improvement.

Table 5.2 — Identifying problems and possible solutions using a cash flow

Problems	Possible solution
Low profitability	Cash flow problems may be a symptom of low profitability. The first step would be to analyse the profit and profitability of each single farm enterprise. Increasing profit and profitability is often the best way to remedy cash flow problems.
Unexpected cash problems	One way to prevent cash flow problems is to identify them before they occur. Cash flow would give the farmers time to alter their plans and remedy the problems by timing cash inflows and cash outflows.
Need to maintain profitability and increase cash flow at the same time	This means a careful look at the combination of enterprises on the farm. Perhaps another crop rotation or livestock enterprise would increase cash flow and allow the farmer to maintain profitability at the same time.
High production costs	An effective way to improve cash flow is through cost control. Is the farmer using the best seeds and seeding rates? Is fertilization at the right level? Can the use of commercial fertilizer be reduced through the use of manure? Can integrated pest management be implemented?
Need to increase selling flexibility	The best approach to this problem is by improving marketing plans. For non-perishable products, the farmer has some flexibility in timing sales. Improving farm profitability should be the main goal in formulating a marketing plan.
Need to reduce cash outflow	<i>Leasing or renting instead of owning.</i> The down payments and loan payments associated with the purchase of land, buildings and machinery sometimes put a heavy burden on cash flow.
Increase cash availability	<i>Taking an off-farm job.</i> Adult farm members could seek part-time or full-time employment off the farm. Any additional expenses related to off-farm employment, such as transportation and clothing, need to be considered carefully.
Increase cash availability	<i>Refinancing.</i> Cash flow problems are sometimes caused by a poor balance of short- and long-term debts on the farm. Some farmers use short-term loans to finance current and fixed assets. Operating loans should be used only to purchase variable inputs.
Increase cash availability	<i>Liquidating assets.</i> Selling assets is usually a drastic measure for dealing with cash flow problems, but it may be justified. However, try to sell unprofitable assets first (e.g. personal assets, timber, replacement stock, unused machinery and unproductive land).

Unit 5.4 – Training exercise 15

Cash flow

Background information

Vegetable sales	\$1 800	Family expenses	\$680
Purchase of seedlings	\$80	Loan repayment	\$1 500
Fertilizer purchase	\$150	New loan	\$1 500
Labour costs (permanent)	\$600	Vegetables in store (beginning of year)	\$1 700
Interest charges	\$260	Vegetables in store (end of year)	\$1 500
Depreciation	\$200		

Task

Based on the background information above trainees should complete the two forms in this exercise.

Form 1 – Calculate profitability of vegetables and total profit of farm

Item	(\$)
<i>Income</i>	
Total output	
<i>Costs</i>	
Total variable costs	
Total fixed costs	
Total farm profit	

(continued on the next page)

Training exercise 15 (continued)

Can the farmer afford to take out a loan of \$1 500 to purchase additional farm implements?

Form 2 — Prepare a cash flow on a quarterly basis

Item	Quarters (\$)				Total (\$)
	first	second	third	fourth	
<i>Output</i>					
Vegetable sales					
<i>Expenses</i>					
Seedlings					
Fertilizers					
Labour					
Interest charges					
Total expenses (\$)					
Cash flow (\$)					
New loan/Loan repayment					
Family expenses					
Net cash flow (\$)					
Total farm profit (\$)					

What is the most appropriate quarter to make the purchase?

(Answer key on the opposite page)

Answer key for Training exercise 15

Form 1 – Profitability of vegetables and total profit of farm

Item	(\$)
<i>Income</i>	
Vegetable sales	1 800
Vegetables in store (end of year)	+1 500
Vegetables in store (beginning of year)	-1 700
Total output	1 600
<i>Costs</i>	
Purchase of seedlings	80
Fertilizer purchase	150
Total variable costs	230
Interest charges	260
Labour costs	600
Depreciation	200
Total fixed costs	1 060
Total farm profit	310

Form 2 – Prepare a cash flow on a quarterly basis

Item	Quarters (\$)				Total (\$)
	first	second	third	fourth	
<i>Output</i>					
Vegetable sales	450	450	450	450	1 800
<i>Expenses</i>					
Seedlings	80	0	0	0	80
Fertilizers	150	0	0	0	150
Labour	150	150	150	150	600
Interest charges	65	65	65	65	260
Total expenses (\$)	445	215	215	215	1 090
Cash flow (\$)	5	235	235	235	710
New loan/Loan repayment	1 500	0	0	-1 500	0
Family expenses	170	170	170	170	680
Net cash flow (\$)	1 335	65	65	-1 435	30
Total farm profit (\$)	1 335	1 400	1 465	30	

Training slides
for Session 5.4.2
Application of cash flow

96 Steps in preparing a cash flow

- Step 1. List sales and expenditure items when they occur**
- Step 2. Prepare a cash flow budget**
- Step 3. Calculate the net cash flow**
(subtract expenses from income for each month)
- Step 4. Calculate the cumulative net cash flow**
(to assess whether the family has enough cash)
- Step 5. Analyse the net cash flow**

The following is a list of the AGSF series TRAINING MATERIALS FOR AGRICULTURAL MANAGEMENT, MARKETING AND FINANCE

1. Farm planning and management for trainers of extension workers in the Caribbean, 2004 (CD-ROM, English).
2. Horticultural marketing extension techniques, 2004 (CD-ROM, English)
3. Farm planning and management for trainers of extension workers. Asia, 2006 (Hard copy and CD-ROM, English).
4. Integrating environmental and economic accounting at the farm level, 2005 (CD-ROM, English)
5. Curso de gestión de agronegocios en empresas asociativas rurales en América Latina y el Caribe, 2005 (CD-ROM, Español)

In preparation

6. Market-oriented farm management for trainers of extension workers. Africa (Hard copy and CD-ROM, English).
- Farm planning and management for trainers of extension workers. Latin America (Hard copy and CD-ROM, in Spanish)
 - Training manuals on farmer business schools. Asia and Africa.

Other work

- FAO Pacific Farm Management and Marketing Series 3, Helping small farmers think about better growing and marketing (Hard copy)*.

* Copies soon to be available from AGSF

Module 5 introduces farm enterprise budgeting and goes on to explain some of the tools that could be used by farmers to make better business decisions. The budgeting tools covered include enterprise budgets, break-even budgets, partial budgets, and labour, cash flow and farm planning.