Chapter 4

Economics and farm management decisions

Farmers should use economic concepts and principles to better manage their farm production

MAIN POINTS IN CHAPTER 4

What decisions do farmers make?

Farmers decide what to produce, how much to produce and how to produce.

These questions are interconnected and depend on a better understanding of the relationship between inputs and outputs.
Key concept • Production function •

How do farmers select products?
Selection of enterprises is often decided by the existing conditions on the farm. Increasingly, this requires matching those farm conditions with the market opportunities.
Key concept • Comparative advantage •

How do farmers allocate resources?
The problems facing the farmer include the inputs required to maximize profits, the technology to select and the best way to produce.
Key concepts • Law of diminishing returns • • Marginal product • Marginal value of production • Marginal cost • Changes at the margin • • Optimum level of output • Marginal analysis •

How can farmers assess financial requirements?
By using the simple principle of cash flow, farmers are able to assess whether or not they will have enough money to carry out their plan or if they are likely to be short of money at any time.
Key concepts • Cash flow • Net cash flow • • Cumulative balance •

How should farmers cost their assets?
Once durable capital assets (e.g. farm equipment) are purchased, resources are tied up. Costs are fixed. Assets can be costed by understanding depreciation and salvage value.
Key concepts • Depreciation • • Useful life • Salvage value •

How can farmers assess whether to buy an asset?
The economic concept used to decide whether or not to buy machinery or equipment is called the return on capital. Farm equipment lasts longer than a single season or year, so decisions must be based on returns over the long term.
Key concepts • Return on capital • • Rate of return • Opportunity cost •

Economic concepts and principles also help farmers make better long-term investment decisions

How do farmers deal with risk?
Different strategies are needed to cope with risk. These include using risk reducing inputs; selecting low-risk enterprises; product diversification; maintaining input, finance and product reserves; contract farming; insurance; using market information.
Key concepts • Risk • Risk-reducing strategies •

WHAT DECISIONS DO FARMERS MAKE?

Farmers face a number of common problems. *What enterprises should they produce? Should their farming system be specialized or consist of a mixture of crops and livestock? What should they grow on what area of land? How should they produce the enterprise and with what methods and technologies? What combination of resources should they use in doing so?*

MANAGEMENT DECISIONS

Selecting the most profitable ***combination of enterprises***

Determining the most profitable ***size of the farm business***

Using credit wisely

Deciding on the most profitable ***methods and practices of production***

Determining the most profitable ***level of production***

Timing production

Making ***marketing decisions***

Determining ***quality*** *of the produce to be sold*

Managing risk

There are many factors that affect the decisions that farmers make, such as the market and the resources available to them. There are also other, less economic, considerations, such as the desires and expectations of the farmer's family and the need to balance leisure and cultural activities with productive activities. The farmer must take these into account when identifying:

- the range of varieties that it is possible to grow;
- the best market and marketing channels;
- the most appropriate time to sell produce;
- the best combination of enterprises to have;
- the amount of each crop and livestock enterprise that should be produced;
- the amount of resources and inputs that should be used to produce these products;
- the best way of producing for the market;
- types of farm practices and technologies to use;
- the ways of reducing risks.

Farm management decisions depend on both economic and social factors

Although the list above is long most of these decisions are interconnected, simplifying the decisions to be made.

The four key decisions to be made by farmers are:

What to produce?

How much to produce?

How to produce?

For which market to produce?

All of these questions can be answered by economic principles that look at the relationship between farm inputs and outputs ...

... which we call **the production function.**

These decisions cannot be easily separated from each other because they are all affected by the limited resources available to the farmer. The decision to be made between different products and their level of production is affected by how they will be produced, which, in turn, is influenced by how much is to be produced. This also affects how much of any resource should be used.

Successful farming needs systematic and rational decisions

The management problems facing the farmer break down into two main areas ...

Discovering the best way of organizing individual enterprises.

Finding the best way of fitting the enterprises together into the farming system.

The first problem requires the farmer to examine the possible enterprises and decide on the most appropriate method of production. The second requires the farmer to see how the enterprises compete and complement one another in their use of scarce resources.

Farmers make decisions through the following means

Tradition

Some farmers base their decisions on tradition. They may rely on traditional methods of management and follow established patterns of farming. These methods have evolved over a long time. For example, a farmer might decide on a cropping pattern based on a crop rotation that is widely used.

Comparison
Some farmers base their decisions on comparison with other farmers. For example, a farmer may apply fertilizer at rates used by others cultivating the same crops.

Economics
Other farmers may base their decisions on economic considerations – looking for ways to make profits. They may look at prices of products and their costs of production and marketing, and then calculate costs and profit. Often these decisions are taken by farmers without complete information. Farmers may not know the prices and costs of products and inputs. In that case profit may be calculated without including all the cost items and without making a proper assessment of the value of production. This may mean that farmers will not maximize profits.

Farming for profit requires economic data and information

Farmers' skills and knowledge of management are limited. Farm records are not usually kept and information on prices and costs is often unavailable. Farmers also have difficulty in calculating profits and assessing how much input to apply. Improvements in farmers' managerial knowledge must go hand-in-hand with improvements in technical skills. Better knowledge of farm management should help farmers to obtain the type of information they need to make better decisions and to better manage the choices that they have.

HOW DO FARMERS SELECT PRODUCTS?

Selection of enterprises is often decided by the natural conditions of the farm. Lowland areas of Asia, for example, have a natural advantage over upland areas for the cultivation of rice. Upland areas with a more temperate climate tend to be suitable for horticultural production. Dairying has an advantage in areas close to towns and cities.

Farmers should identify enterprises suited to the natural conditions of their farms

Even where there are such advantages, farmers still face choices. For example, a lowland farmer may have to decide between growing cereals for home consumption or growing cash crops. Similarly, upland farmers may have to decide between rearing livestock and cultivating horticultural crops. Farmers often decide by using some of the economic principles and concepts discussed in this guide without even knowing it. Selection of enterprises takes place through looking at supply and demand.

Farmers must have good knowledge of their farms, including the type of soils and their quality, water sources and topography as well as an idea of the type of crops that can be grown. They need to know whether they have sufficient capital and labour to produce the enterprises and whether they might require more labour and machinery at particular times of the year, for example, at harvest periods. They must also have an idea of the gross margins that they can earn from the different enterprises.

Farmers need to have a sense of what consumers in the market want. *What are retailers or wholesalers willing to pay for the product? What distribution channels are available? What is the cost of transport? What crops and livestock enterprises can fetch high prices?* Market-oriented farming requires matching supply with the demand.

The location of the farm in relation to the market and the transportation network also has an important influence on enterprise selection. It is often profitable to farm land more intensively the closer it is to the market. Transportation costs also influence the choice of what to produce. The closer the farm is to the market the cheaper it is to transport produce. Transportation costs for products and inputs need to be included in the gross margin calculation of the enterprise.

Box 1
Transportation costs

Comparative advantage

There are other questions that farmers face that relate to the selection of farm enterprises. A common decision concerns whether to specialize in a single enterprise or whether to diversify the farm. Farmers need to decide to concentrate on only one or two enterprises or on a number of enterprises. The economic principle for choosing what to produce is called "comparative advantage". Very simply, this concept explains how farmers select those enterprises where profits are likely to be greatest.

Farmers can apply the concept of comparative advantage to select high profit enterprises

Farmers often have a choice of enterprises that tend to compete with one another for land. An expansion of one enterprise means a reduction in another. Comparative advantage indicates how farmers can decide on which plots to grow different crops. Consider a farmer who is thinking of planting three crops, *maize, millet* and *tomatoes*, on three plots of land that are the same size, but which have varying soil fertility and climate. *Which crop should be selected for each plot?* The farmer needs information on yields, prices, inputs, costs and gross margins to help make the crop selection (see Table 3).

Table 3 shows the projected gross margin (yield *multiplied* by the selling price *minus* the costs of production) for the three crops when grown on each of the three plots.

Table 3
Gross margin ($ per ha)

Plot	Enterprise		
	Tomatoes	Millet	Maize
A	**91**	78	59
B	64	**67**	51
C	31	20	**40**
Total	**186**	**165**	**150**

The figures in the table show that Plot A has an absolute advantage over the other plots for all three crops. The gross margin generated from Plot A is higher than that of the others, perhaps because of higher yields as a result of better soil fertility. Out of the three crops tomatoes have the greatest advantage (i.e. the highest gross margin). On Plot B millet generates the highest gross margin. Plot C generates lower gross margins than both A and B for all three crops, with maize being the most profitable crop.

Decisions on enterprise selection should also be based on economics

The farmer has a choice of specializing by growing the same crop on all three plots or choosing a crop mixture (diversifying). In this example, the size of each plot is the same and the gross margin that can be earned via *specialization* or *diversification* can be seen below.

Specialization
If one crop is grown on all three plots the farmer could earn $186 from growing tomatoes, $165 from millet and $150 from maize.

Diversification
By diversifying with a different crop planted on each of the plots, the farmer could earn $198 from a combination of the three crops: $91 for tomatoes from plot A; $67 for millet from plot B; and $40 for maize from plot C. In this case the farmer would do best to diversify. However,

prices and yields can fluctuate so unless there are significant differences, the farmer may do best to stick with the farming system with which he or she is comfortable.

HOW DO FARMERS ALLOCATE RESOURCES?

Farmers who want to maximize their profits should make the best use of scarce resources such as seeds, fertilizers, pesticides, land, labour and machinery. The most efficient use can only be calculated if the physical relationship between the resource inputs and the outputs produced are expressed in economic terms. The typical decisions that farmers have to make are:

- *What quantity of inputs should be used to maximize farm profit?*
- *Which technology should be applied?*
- *Which production method is best used?*

Economic principles are used to determine the most efficient use of resources and the best technologies and methods of production

These questions are closely related and cannot be easily separated. Many farm decisions concern how much of a single "factor" to use in order to maximize profits. *How much seed should be used? How much fertilizer should be applied? How much hired labour is required?* Asking these questions is the same as asking which level of yield per hectare or how much weight gain per animal will give the greatest profit.

There are many farmers who still talk of the greatest yield per hectare, the highest production per animal, and so forth. But the greatest yield is often not the level of production that generates the highest profit. The farmer interested in competing in the market needs to think about gross margins, profit, costs and returns – not merely maximum yields.

Box 2
Highest yield does not always give highest profit

Extension officers are trained in production practices aimed at maximizing production. However, advice given to a farmer that is based only on production possibilities can work to the farmer's disadvantage. Farmers need to understand the impact of production decisions on profitability. In particular, they need to understand the law of diminishing returns. Sometimes, producing less is more profitable than producing more.

Law of diminishing returns

The relationship between inputs and outputs rests on the *law of diminishing returns*. This law is used to explain how farmers determine the level of input use needed to maximize profits. It is useful in assessing the level of output that can be produced either from a single plot or from the entire farm. Variable resources such as labour, water, seed and fertilizer are applied to a fixed area of land. The law of diminishing returns shows that beyond a certain yield, the rate of increase in yields decreases, such that the additional input cost is not compensated by additional yields.

The "marginal concept" can help us to understand "the law of diminishing returns"

The marginal concept

The term *marginal* is used often in economics. It has the same meaning as *additional*. It can refer to either output or input. In both cases it can be measured in either physical or financial terms. Thus, the marginal product per unit of input means the addition to total production achieved by adding one more unit of input. Similarly, *the marginal value of production* means the value of the marginal, or additional, product. It refers to the value added to the total value of production by adding one more unit of input. Other common marginal terms include: marginal input and marginal cost, which refer respectively to added inputs and the cost of an added input.

Table 4 shows an example of the marginal product per unit of input for maize. The marginal product (or added yield) is calculated as the difference between different levels of total production. This appears in the third column.

Table 4
The marginal product for maize when adding different levels of fertilizer

Quantity of fertilizer (bags)	Total product of maize (bags)	Marginal product of maize (bags)
0	0.5	0
1	1	0.5
2	2.5	1.5
3	3.4	0.9
4	4.0	0.6
5	4.5	0.5

In this example, when no fertilizer is used, there is little yield (total product = 0.5). When one bag of fertilizer is applied, the total product of maize is 0.5 bag. This is the marginal product. When the quantity of fertilizer is increased from 1 bag to 2 bags the yield increases to 2.5 bags. This gives a marginal product of 1.5 bags of maize (2.5 – 1.0 = 1.5).

When the amount of fertilizer is increased from 2 bags to 3 bags the total product increases to 3.4 bags. But note here that the marginal product has decreased to 0.9 bags. The returns to the amount of fertilizer being applied are diminishing (decreasing). As fertilizer application is increased further, we can see that while the total product continues to increase, the marginal product continues to diminish.

We can see in Table 4 the effect different levels of fertilizer have on production. It is the first step in deciding the amount of fertilizer needed. The next step is to look at this information in terms of value of production and costs (for this see Table 5).

Total production (bags)	Total value of production ($)	Marginal value of production ($)	Quantity of fertilizer (bags)	Total cost of fertilizer ($)	Marginal cost of fertilizer ($)	Gross margin ($)
	(A)			(B)		(A – B)
0.0	10	0	0	0	0	10
1.0	20	20	1	8	8	12
2.5	50	30	2	16	8	34
3.4	68	18	3	24	8	44
4.0	80	12	4	32	8	48
4.5	90	10	5	40	8	50
4.9	**98**	**8**	**6**	**48**	**8**	**50**
5.2	104	6	7	56	8	48

Table 5
Costs and returns for maize

The critical question here is:
"How much fertilizer should the farmer use?"

Optimum level

How much of each resource the farmer uses depends on the cost compared with the return. The most economically rational choice is the point of *optimum level* of output. This is where the value of the marginal product is just sufficient to cover the cost of the resource used.

In Table 5, this occurs at a level that lies between 4 and 5 bags of fertilizer (shown in bold). The gross margin at this level of production is $50. Any application of fertilizer below this level results in a marginal value of production that is greater than the cost of fertilizer. This means that the farmer would increase the gross margin if more fertilizer were applied. With 2 bags of fertilizer, the gross margin is $34. At fertilizer levels above 6 bags, the gross margin begins to decrease. In this example, however, there would be no value in applying the sixth bag of fertilizer as it would not increase the gross margin.

So long as the marginal value of production exceeds the extra cost, the gross margin is increased by using more of the fertilizer input. As noted, there

comes a point when it is not profitable to apply any more fertilizer to the crop. This is the point in the production process where the marginal value of production equals marginal costs. However, because prices often fluctuate, the optimum level of output cannot usually be as easily predicted as in this example.

Farmers who try to maximize production need to understand the costs involved ...

Will using this resource cost me more than the money I will receive in return? This question is applied to many farm decisions. *Will feeding poultry an additional 5 kg of feed add more to returns than to costs? Will costs or returns increase more if the output of milk per cow is increased to 100 litres? If we add another hired labourer or expand the area under cultivation, will we add more to returns than to costs?*

... and try to optimize the use of their resources.

The practical experience of farmers closely follows the concept of marginal analysis. Farmers who economize do not usually completely favour one product or resource over another. They normally decide whether to have a little bit more of one and not quite so much of the other. Farmers tend to apply inputs in small steps. They might test the application of fertilizer or seeds over a number of years, gradually trying out different combinations of inputs and outputs before deciding on an optimum level. As more experience is gained over the years through demonstrations or trials an optimal allocation of fertilizer can be reached. This often differs from recommendations that are given by agricultural extension workers. It is up to the farmers to test the combinations and arrive at their own decisions as to the most profitable application.

HOW CAN FARMERS ASSESS THEIR FINANCIAL REQUIREMENTS?

We have previously discussed gross margin as a way of assessing the profitability of an enterprise. This indicates how worthwhile a change in enterprise may be if planned quantities and prices are realized. But if a new enterprise is introduced into the farming system a cash flow analysis also has to be prepared to assess whether the farm will generate enough income to cover required expenditures.

Cash flow is a useful concept to determine the availability of money at any given time

As we discussed in Chapter 2, cash flow is the flow of money into the farm from sales and the flow of money out of the farm through purchases. Cash flow calculations can help farmers assess whether they will have enough money to carry out their plan or if they are likely to be short of money at any time. They enable the farmer to identify the time of the year when additional financial resources may be required.

For example, a farmer and his family know that growing tomatoes on their farm will be profitable, but they are not sure whether they will have enough funds to finance the change to tomatoes. They need to find answers to a number of questions: *How much money is likely to be generated from producing tomatoes and how much will it cost? What enterprises will have to be reduced as a result of introducing tomato production? When will the money be received from sales of produce and when will money be needed to purchase inputs? How would any shortfalls be made up if the amount of money expected over the year does not cover the amount needed?*

To answer these questions the farm family has to lay out planned income and expenses over the year and assess whether they will have enough cash to cover the costs of growing tomatoes. This is done by calculating the cumulative cash flow (see Table 6).

Table 6 shows that over the first quarter the net cash flow (difference between inflows and outflows) is positive at $180. Over the next quarter the net cash flow is negative (– $250). Assuming that the family had no money at the beginning of the year the cumulative balance is – $70 ($180 – $250). This shows that there is not enough cash available to cover expenses in that period. In quarter 3 the net cash flow is $314, again showing that there are adequate funds. The cumulative balance increases to $244 (– $70 + $314).

But over the next quarter the net cash flow shows a deficit of $35. This reduces the cumulative balance for that period to $209. The overall cash flow shows that not enough money is available from the sale of maize, milk, chickens and tomatoes to cover the increased expenses of the new enterprise. The cumulative cash flow is negative in the second quarter. The farming system does not produce enough cash to cover the additional expenses at certain times of the year. The proposed change is profitable but the family does not have cash available to finance it.

Table 6
Example of a cumulative cash flow

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
Sales of farm products					
Maize	250		300		**Inflow ($)**
Milk			60	60	
Chickens	130				
Planned sale of tomatoes		60	120		
Total cash inflow (A)	380	60	480	60	
Purchase of inputs					
Maize inputs			56		**Outflow ($)**
Farm inputs (livestock)	30	50	50	50	
Chicken feed	20			20	
Tomato inputs		30	40		
Family expenses	150	230	20	25	
Total cash outflow (B)	200	310	166	95	
Net cash flow (A – B)	**180**	**- 250**	**314**	**- 35**	
Cumulative balance	**180**	**-70**	**244**	**209**	

With a profitable enterprise but a cash flow problem: *What could the farm family do?* In this example one possibility could be to bring forward the sale of maize in the third quarter to the second quarter. Perhaps the family was keeping the maize in store, waiting for a higher price later in the year. By selling earlier they would get a lower return from maize but would be able to overcome their cash flow problem. Alternatively, the family could consider taking out a short-term loan.

HOW SHOULD FARMERS COST THEIR ASSETS?

Depreciation and salvage value are used to cost assets

Farmers often have to make long-term decisions that, once taken, influence the day-to-day management of the farm. As we know, farmers are faced with decisions on whether to purchase assets such as machinery, equipment, or livestock and to plant tree crops. Once decisions are taken and money is spent, resources are committed and the costs become "unavoidable". The resources are then tied up on the farm and the assets are regarded as a fixed cost to the farm.

After capital items such as machinery and equipment are purchased they immediately begin to depreciate in value. *Depreciation* is the loss of value of an asset over time, either because of it being used or because it will eventually become obsolete. This is an

Hand tools, watering can and wheelbarrow – Burundi

Investments with long-term consequences ...

Handheld tractor – Nepal

... such as acquiring farm tools, machinery and equipment ...

... or planting semi-permanent or permanent crops ...

A young lemon and papaya plantation – El Salvador

... must be regarded as fixed cost.

important factor to consider when looking at farm costs, as eventually the item will have to be replaced. The following example gives a fairly accurate idea of the cost to use an item for a year.

An example of calculating depreciation

Assume the cost of a plough is $200. It has a life of 5 years. Therefore, each year one-fifth of the cost of the plough is taken off its value and is treated as an annual fixed cost. This can be calculated as follows:

Depreciation = Purchase price ÷ Life of item

So, $200 ÷ 5 years = $40 per year, or the amount to be deducted each year for five years as a fixed cost.*

As time proceeds there will be a need to replace an asset. If a farmer buys a capital item but wishes to sell it before the end of its life span, the value of that asset is called the salvage value. This is the value that remains unused. If a farmer sells the asset after two years, even though it has a life of five years, its salvage value would be the original price minus the cost of depreciation over the two years.

* Although there are more complicated ways to calculate depreciation, this is the easiest and most commonly used in farm management

HOW CAN FARMERS DECIDE WHETHER TO BUY FARM ASSETS?

Decisions on buying assets are important ...

If farmers want to buy equipment, machinery or livestock how do they decide what to do? This decision is different from the questions raised in the previous sections. *Why?* Machinery, farm equipment and livestock last longer than a single season or year. Therefore the purchase of these items requires decisions with long-term implications.

... they tie up money and determine the farm's future profitability for many years ahead

The concept that is frequently used in economics to decide whether or not to buy items of machinery, equipment or livestock is called the *return on capital*. This is the total benefit derived from using the capital, less the extra costs incurred, including depreciation, maintenance and repairs. The return on capital expresses the profit expected from the investment, which is, in turn, related to the capital required to give a percentage rate of return on the capital.

The return on capital is calculated as follows:

$$\text{Rate of return} = \frac{\text{Additional annual profit}}{\text{Cost of investment}} \times 100$$

First, the amount of capital required has to be calculated. This is simply a question of adding up the sum required for livestock, buildings, machinery or equipment as well as the extra working capital required for seeds, fertilizer or other inputs. Second, the additional profit is calculated by budgeting out the additional income against any additional costs. As explained before, the use of gross margins considerably simplifies such budgeting. One must not, of course, forget any increase in fixed costs, and costs of rent,

labour, or machinery. Included also in the additional costs should be an allowance to *cover depreciation in the capital investment* and also any *additional maintenance costs.*

After estimating the capital required
and the resultant profit,
the return on capital can be calculated

An example of estimating capital required

A maize farmer with two dairy cows is considering doubling the herd to four animals. The decision calls for a number of changes to be made on the farm. It requires buying more animals, and involves introducing some equipment and constructing a shed, as well as making sure that enough fodder is grown to feed the animals.

The additional capital required is assumed to be:

Livestock	$360
Equipment	$ 60
Shed	$250
Working capital	$100
Total additional capital required	$770

The extra profit from increasing the dairy herd size has been budgeted as follows:

Additional gross margin from milk sales			$413
(Less)	Maize gross margin	$46	
	Additional labour	$10	
	Additional maintenance costs	$ 5	
	Depreciation of shed and equipment (10 years)	$31	
			– $ 92
Additional profit			$321

Here, the decision to increase the number of cows will also involve a change in the cropping pattern to provide more fodder to feed the increase in dairy cows. Some of the land under maize cultivation would have to be given up. The value of the area of land to be placed under fodder cultivation is the value of the area of maize lost. This is the opportunity cost of the alternative use of the land. Here the opportunity cost of the land lost to maize has been estimated at $46 .

Box 3
Guidelines for assessment

Each capital item is normally valued at its purchase price or cost of production.

Profit is determined by calculating the additional income compared with additional costs. Additional profit that the farmer can make as a result of this change is estimated by calculating the increase in gross margin of the extra head of livestock.

The additional profit is then calculated as the increase in profit from the dairy cows minus the opportunity cost of the land needed to grow more fodder. The overall increase in profit is $321 ($413 – $92).

The rate of return is expressed as the increase in profit as a percentage of the capital cost. In this example the return is calculated at 41.6 percent. The level of return is satisfactory and providing the figures used in the budgets are reasonable and not over-optimistic the investment looks worthwhile.

After calculating the rate of return, the farmer then has to decide whether it is worthwhile to make the investment. The anticipated rate of return on capital will clearly need to be higher than the rate of interest if the money has to be borrowed.

The *minimum rate of return* that the farmer desires has to be assessed. The farmer needs to assess the real cost of making the investment in the dairy enterprise. Sometimes farmers take out loans to finance the purchase of equipment. When they take out a loan they are usually charged a rate of interest. The interest payment is the *cost of capital*. Clearly, the rate of return must exceed the cost of capital by quite a lot if farmers are going to take the risk to invest.

Farmers must assess their "minimum rate of return" before deciding if it is worthwhile to make an investment

But some farmers may decide not to take out a loan and use their own savings instead. Even though there is no cash payment of interest to be made by the farmer, there is still a cost involved. This is the cost of the earnings given up by not putting money into an alternative use. This is an *opportunity cost*. A farmer might have used that very same capital in a way that could also have earned money. For example, the farmer could have kept the money in a savings deposit in the bank where it would have earned interest.

In practice, most small-scale farmers select a minimum rate of return in excess of 30 percent per annum. This is quite high but reflects the fact that there are always risks involved in going into a new venture.

Ultimately, the farmer's decision depends on a number of factors:

- *Is there an alternative use for the money?*
- *Is the farmer interested in taking a risk?*
- *Do the capital items require new skills and training?*

The farmer may expect a high rate of return to justify taking the risk of a new enterprise and going through the trouble of learning and developing new skills. Alternatively, if the farmer feels that it is relatively simple to increase the size of the dairy enterprise and to operate the new equipment, then a lower rate of return may be satisfactory. The decision is the farmer's and every farmer will have his or her preference.

HOW DO FARMERS DEAL WITH RISK?

As noted earlier, one of the facts of farming is that the farmer faces numerous risks because many future events cannot be known with complete accuracy or certainty. Risk influences the amount of inputs that the farmer uses as well as their cost. Similarly, there is uncertainty in crop yield and product prices. As a result, farm profits are always uncertain and this makes farm operations risky. The more common sources of farm risk can be divided into the five areas outlined below.

Production risk
Factors that affect the farm yields such as pests or diseases, poor weather, low rainfall or drought.

Marketing risk
Uncertainty about market prices, and the supply of and demand for products.

Financial risk
Availability of funds for development, the possible need to borrow money and the ability to make repayment.

Institutional risk
Changes in the provision of services from institutions that support farming, for example banks, cooperatives, governments or social organizations.

Human risk
Availability and productivity of farm workers as affected by accident, illness or death, or political or social unrest.

Some farmers try to understand risks better and they may even make plans to reduce them when they can. For example, in response to a production risk, a farmer may decide to plant a drought-resistant variety in order to reduce the risks of low rainfall. The farmer knows that the yield from the drought resistant variety is likely to be lower than that of a higher producing variety but does this as a precaution of the risk of rainfall being low.

As manager of the farm business, the farmer has to cope with the many different types of risk. Different ways that farmers deal with risk depend on their personality and the extent to which they are willing to gamble. Farmers are different, some will take more risks than others.

The differences in the decisions that farmers take also depend on their family and financial situation. For example, if a farmer had financial savings and the crop failed the family would not go hungry. The farmer can perhaps afford to take more risk than a family with no savings. So the farmer's decision is complicated and depends on many factors. In particular, the higher the demands on the farmer for cash, the less likely he or she will be to take a risk.

Risk-reducing strategies

Decisions on what to do vary among farmers but there are some common ways of dealing with risk. Some of these may require either a reduction in the level of production or, alternatively, an increase in the costs of production over a period of years. This often means that in order for farmers to manage risk they may have to give up a part of their profits in the short term.

Use risk reducing inputs. Buy inputs and materials that better control crop diseases, pests and use of water, and reduce animal health problems. Such inputs could include drought-resistant varieties, pesticides, fungicides and vaccines for animals.

Select low risk enterprises. Choose enterprises that are more stable than others. For example, those employing reliable crop varieties or those with well-established channels of marketing.

Ensure system flexibility. This allows the farmer to shift from one cropping pattern to another. For example, with some enterprises land used can be increased or reduced easily without affecting profitability.

Product diversification. This can increase the number of enterprises on the farm so that if one fails, the income from others will be sufficient to keep the farm going. Not all enterprises are likely to fail together.

Maintain input, finance, product reserves. Farmers can keep reserves such as money, physical inputs, final products, food. Such reserves would help protect the farm family from the risk of price changes. Food reserves also provide some security against the risk of crop failure, although storage losses can be a problem.

Farmers often try to weigh the amount of "riskiness" when they are making plans

Contract farming. Price uncertainty may be eliminated by making advance contracts with buyers. Farmers may contract with suppliers to provide inputs at specified prices and also to avoid the risk that key inputs will be unavailable at critical times. There are, however, risks with contract farming to be considered. For example, if a cash crop is produced the world market price may collapse leaving the buyer unable to honour the contract.

Collecting market information. Good information on seasonal price variations and changes in prices over the years can be used to plan when produce should be marketed. The more knowledge farmers have about price change and the past profitability of enterprises, the better their position when they plan for the future.

Insurance. Private companies or governments may guarantee a certain amount of money in the event of

a major catastrophe, in return for an annual premium. Some countries will ensure against crop loss from hail or hurricane. Farmers must give up a certain amount of their yearly income in return for this security .

Better management practices. If farmers recognize early on that their crops or livestock are diseased they can respond more quickly to spray crops or inoculate livestock. However, these precautions are likely to increase costs and reduce profits and such actions would need to be set against the greater security that is gained.