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Farm management extension guide

A photograph of a woman wearing a white long-sleeved shirt, a white hat, and a necklace, standing in a cornfield. She is looking down at a corn plant she is holding. The background shows rows of corn plants.

ECONOMICS for farm management extension

by
David Kahan

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Preface

Whether you are working for government, an NGO or the private sector, if you are an agricultural extension worker who is trying to assist farmers in increasing the profitability of their farms, the material in this booklet should be of help to you.

It introduces you to some of the concepts and principles of economics that are relevant to smallholder farming – particularly market-oriented farming. You will learn the application of these economic concepts to the day-to-day farming activities of farmers producing for the market. You will look at some of the critical areas in which farmers make decisions about their farm enterprises. Through this you will gain an insight into the decisions that farmers make and be better equipped to advise them on how to become more market-oriented and thus increase their profits.

This guide has been produced by the Agricultural Management, Marketing and Finance Service of FAO (AGSF). It is one of a planned series of guides and other materials that look at some of the common farm management challenges facing farmers and ways of meeting them.

Contents

Preface	iii
Acknowledgements	vi
Chapter 1 INTRODUCTION	1
Chapter 2 KEY ECONOMIC CONCEPTS	13
Chapter 3 ECONOMICS AND THE MARKET	35
Chapter 4 ECONOMICS AND FARM MANAGEMENT DECISIONS	53
Chapter 5 SUMMARY	81
Glossary	87

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David Kahan

Chapter 1
Introduction

*An example
of a typical
situation
faced by an
agricultural
extension
worker*

A small-scale farmer runs a three hectare farm. She grows maize, a mix of beans and pumpkins, has two dairy cows and keeps some chickens around her home. Her farm has sustained her and her family comfortably for a number of years. While producing for home consumption, she has always produced a surplus which she has sold for cash on the local market. Now that her children are older, she feels the need for more cash. She knows that it should be possible to make more money from her farm.

She recently heard on the radio that there had been an increase in the demand for vegetables and high prices could be obtained. The announcer said that farmers who know how to produce tomatoes may be able to make good profits. She wants to gain more out of her farm. Beans have not been very successful and she is considering introducing tomatoes as an alternative. She wonders whether this change will increase her income. To produce for the market will cost her money, which she will have to pay out before she sells her produce. These are some of the factors that she will have to take into account before making a final decision.

***If this farmer asked you for advice
about markets, demand, profits and return
on investment in tomato production,
would you be able to answer her questions?
Would you be able to give her good advice
on the management of her farm?
If not, then the contents of this guide
will be of particular use to you.
It begins with a review of farm profits,
markets, farmer goals and economics.***

MAIN POINTS IN CHAPTER 1

Market-oriented farming: farming for profit

Farming for profit requires that farmers grow crops or raise livestock that can be sold on the market.

Farmers should understand markets ... what leads to profits and what leads to losses.

Farm production must match market requirements

Goals for farm and family

Good farm management requires clear goals. Goals give a focus for making decisions. Some important goals are food security, profit maximization, risk reduction and providing education for children. These and other goals influence planning and decision-making on the farm.

Goals give focus to making decisions on the farm

Economics in farm management

Economics as it applies to farming is about the choices that are made in order to obtain the most from available, often limited, farm resources.

Economics provides ways to analyse and compare the profitability of crops and livestock under different circumstances.

Farm resources should be used in the most efficient manner



MARKET-ORIENTED FARMING: FARMING FOR PROFIT

More and more farming families are finding that they increasingly need to produce farm products that can be sold for cash. Farming for profit requires that products produced on the farm are sold. This is more complicated than simply farming for food. Farming for profit requires that the farmers grow crops or raise livestock that they can sell on the market. It also requires that farmers understand markets and profits. Market-oriented farmers need to understand the kinds of products that consumers want, the quality of the product they must produce, the quantity demanded and the price that consumers are willing to pay.

*Farmers need to
acquire new skills
and techniques
in order to
farm for profit*

We now have a global economy where farm products may be sold anywhere in the world. These changes create opportunities for farmers to earn more money and to make more profits. To take advantage of these opportunities, farmers will need to manage their farms in a market-oriented way. Farming for the market requires that farmers become better decision-makers. They must also be able to compete with other farmers. The farmer must develop greater skills in buying and selling, and in farm business management.



GOALS FOR FARM AND FAMILY

Goals set the framework and give a focus for making decisions. Farmers and their families have goals. In many parts of the world the family household and the family farm cannot be separated. Therefore, the goals of the household and the goals of the farm often interlink.

*Good farm
management
requires
clear goals*

Farmers run their farm business. They are the decision-makers. A farmer can be a husband, a wife, a son or a daughter; whoever takes the many day-to-day decisions needed in farming. To ensure better farm management decisions, farmers must have control of the resources needed to produce a crop or livestock product. If they are farming for the market, they will also need to have a good understanding of that market.

Some common goals of farm families

Food security

A primary goal for every farm family

Profit maximization

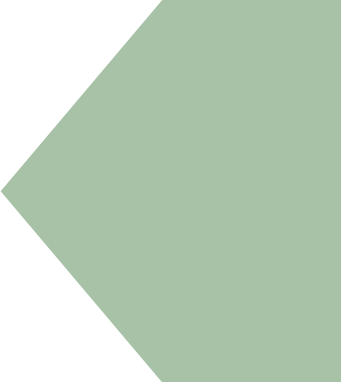
*Farm families need more than just food
and any cash needed
must often come from the farm*

Risk reduction

Risks can create great losses in income

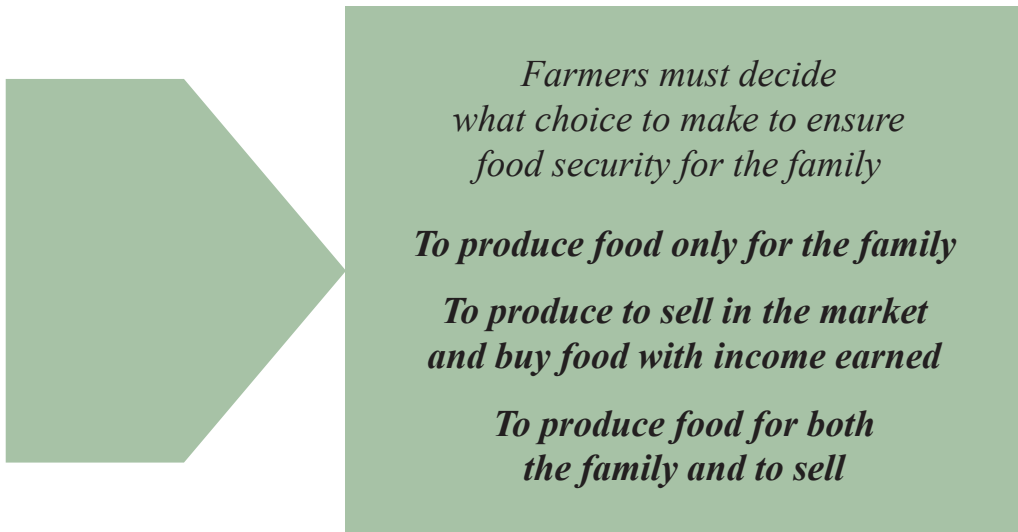
Social goals

*The quality of family life may have a
higher priority than just making money.*



Food security

Every family needs to ensure that it has sufficient, nutritionally adequate and safe food for an active and healthy life throughout the year. This is one of the primary goals of every farming family, especially those whose only source of income is the family farm.



***For most farmers
the main source
of cash is usually
the farm***

Maximize profits

Farm families need more than just food. They also need clothes, education for the children, household items and other goods, all of which require cash. Their main source of cash is usually the farm; therefore they have to make profits from their farms.

To make profits a farmer buys inputs, uses them on the land to produce goods and then sells the goods in the market. When the income from the sale of products is *greater* than the cost of producing them the farmer makes a *profit*. When farming for profit, farmers should set goals to gain the most out of their farm – to maximize profits.

Choosing between farming for food and farming for profit is a very serious decision. *How much of the farm should be used for generating cash? Should the whole farm be committed to producing for the market or should some part of it be set aside to provide food for*

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Women collecting food for the family – Ecuador

Food for the family comes first ...

© FAO/22632/J. Spaul



Selling fruit for family income – Georgia

... though to live well the farm family also needs to make money ...

© FAO/21667/J. Spaul



Improved watering using a pump – Zimbabwe

... which may require farmers to change their farming practices.

the family? Farming for profit can be very risky because there are many other farmers producing for the market. This creates competition and requires that the farmer be very skilful, both as a farmer and as a manager.

Risk reduction

While profit is an important goal, many farmers are more concerned about reducing risks. Risks come in many different ways. Rainfall may be scarce or fail, prices for goods may fall, and pests and diseases may affect crop yields. These are only some of the many risks that farmers face.

While profit is an important goal, reducing risk is of major concern

The risks of farming can create large differences in the income that the farm family earns from year to year. An important goal among smallholder farmers, particularly poorer farmers, is just to survive. A wish for security is a normal motive for all people. Some farmers see this as a more important goal than making profits. But the goals of trying to reduce risk and to increase profit do not have to conflict. Those farmers who generate more profit are often better able to survive the bad years in farming when yields and prices are low.

Social goals

Many farmers are more concerned about their quality of life than they are about making more money. They may be more interested in making sure that farming gives them the time available for family, community or leisure. Some farmers may not be interested in a particular farm enterprise even though they could earn high profits from it. Farmers often have preferences for different enterprises. Some may not want to raise pigs or poultry; others may not want to keep cattle even if cattle are highly profitable. This is often related to family traditions, culture, religion and even social standing in the community.

For some farmers profit is not the main goal

Before you can effectively advise farmers about farm management decisions, you will need to understand the goals and motives of the farmer and the farm family. All decisions that farmers make have to refer to their goals.

Some of the questions that extension workers may wish to ask farmers are therefore:

- *Do you want to produce all your food requirements?*
- *How important is it for you to make profits in order to be able to buy things?*
- *To what extent are you willing to take risks?*
- *Do you wish more time for family, community or leisure?*
- *Are there any crops you prefer to grow or animals you prefer to rear?*
- *Are there any crops or animals that you would not want to grow or rear?*

Farmers' preferences and goals affect the decisions they make about their enterprises: *What to grow? How to grow? How much to grow? For whom to grow?* These goals guide their choices between different courses of action.

Goals are about *satisfaction*. However, when a farmer earns profits, this may not, by itself, satisfy family needs. The profits earned will only provide satisfaction if the money is used responsibly or in a way that matches the farmer's goals. Very few households would be satisfied if money earned was not used, that is to say just saved and never spent. This idea of satisfaction usually occurs when goods and services are purchased out of the profits made. We can conclude that the more general goal of farmers might be to maximize satisfaction. But that satisfaction must benefit the entire farm family. A farmer who maximizes profit and then spends it all on beer will not be maximizing satisfaction for the family.

Achievement of farm family goals such as food, profit or social status brings satisfaction

You need to understand the broad range of goals that farmers may have. This could provide you with a better understanding of the reasons behind many of the decisions that farmers make. For example, a decision taken by a farmer to select a farm enterprise that maximizes profit could result in wide variations in yields, and thus income, from year to year.

*When profits
are made ...*

*... goods and
services can
be bought ...*

*... and farm
households
benefit.*



Enough maize to sell – Honduras

© FAO/101731/Velez



Goods for farm household use – Brazil

© FAO/CU000649/R.Faldutti



A family working together – Congo

© FAO/23937/M.Bleich

Unless the farmer has money in the bank to cover these risks, the goal of profit maximizing may not be as sensible as selecting an enterprise that produces a lower but more stable profit. These considerations limit the extent to which profit is the main driving force. The use of profit in farming, however, does have a common purpose: it allows all of the farm family goals to be expressed in money values. In this way better decisions can be taken.

Various cases to consider

A farmer is continuing with an enterprise that is losing money regularly.

The farmer needs to be aware that this is happening.

A farmer chooses a less profitable enterprise over one that is more profitable.

The difference in profit would indicate the loss to the farmer because of the choice.

A farmer chooses a social goal over maximizing profit.

Any loss of profit can be calculated and expressed in money terms.

In each of the cases above, knowing the cost of choices made provides the farmer with information to assist in making a more balanced judgement. But there is a bottom line. Market-oriented farming does require a business approach and profit is important to bring about a good living for the farm family. Profit generates the capital needed to reinvest in the farm: to buy machinery and implements, to carry out soil conservation measures and to introduce irrigation. It also provides the purchasing power for medical and health services, education, recreation and food.



ECONOMICS IN FARM MANAGEMENT

Economics is about wealth, that is the use of often scarce resources to produce and exchange goods in order to create wealth. Farmers have limited amounts of land, labour, money (or credit) for inputs and other resources to use on their farms. *Farm management* is about making decisions regarding use of the resources available. Wealth is created by putting resources together. How farmers use their resources affects how much wealth they can create.

How efficiently farmers use their resources affects the level of wealth that can be attained

An example of
assessing resource utilization

A farm family have chickens. *Should they eat the chickens or should they look after them and have a regular supply of eggs? If they decide to keep the chickens for their eggs, should they eat the eggs or should they sell the eggs? Which is the best use of their resources?*

Learning about some of the key economic concepts does help farmers make these decisions. These principles lie at the heart of farm management and knowledge of them is important for good decision-making. Learning about some of the key concepts of economics helps farmers to have greater control over the processes that influence their wealth. It can help farmers understand which choices or decisions will lead them to more wealth.

Chapter 2
Key economic concepts

MAIN POINTS IN CHAPTER 2

Factors of production

The main factors of production are natural resources (land, water, soil, rainfall), labour and capital.

Farm enterprises

These are different products produced by farmers, each of which uses inputs to produce outputs. Farm enterprises can be divided into three types: competitive, supplementary and complementary.

Cost of production

Value of inputs needed to produce crops or livestock. Variable costs apply to a specific enterprise. Fixed costs generally apply to the farm as a whole.

Opportunity cost

When a limited resource is used on one enterprise it reduces the opportunity to use it on another. Also, time spent on a farm enterprise reduces the opportunity for social or leisure activities.

Value of production

Money received from the sales of produce, added to the value of that consumed or stored.

This chapter outlines the main economic concepts and principles that apply to farm management

Gross margin

*What an enterprise adds to total farm profits
(Gross margin =
Value of production – Variable costs).*

Farm profit

*Money left over after variable
and fixed costs are paid.*

Net farm family income

*Farm profit after taking into account
cost of family labour used to generate it.*

Cash flow

*Difference between money received (inflows)
and money paid out (outflows).
(Although a farm may be able to make a profit,
there may be times of the year
when it runs out of cash and is then
unable to purchase inputs and materials).*

Substitution

*Replacing one method of production
with another that is more efficient
in terms of labour, time or money*

Efficiency: return to scarce resources

The wise use of resources available to the farmer.

Risk

*Weather and diseases affect farm yields.
Changes in market prices and input prices vary.
Farmers must take these and other risks into account.*

*These concepts
and principles
of economics
will be
elaborated on in
the remaining
chapters of
this guide*



FACTORS OF PRODUCTION

Factors of production are the resources needed to produce something. The main ones are:

- natural resources
- labour
- capital

Natural resources

Natural resources are what can be called “gifts of nature”. They include land, water, soil and rainfall. These are resources that are not the result of what is called “human effort”.

Land. A typical farm family may own or rent some land for cultivation. The farmer’s homestead may also have land around it that could be used for growing food, fruit or forage crops. Many farmers have the right to use what is called “communal land”. This is usually land used as a forest or for cattle grazing.

Water. Farmers have access to water directly from rainfall and from springs, dams, wells and rivers or from water collected from rainfall. This water may be on the land used by the farmer or it may be from a communal source.

Labour

Labour is the work of farmers, their families and hired labourers. This is human effort and it is needed on all farms. Farmers may have three different sources of labour: the farm family (family labour), hired labour and labour provided through cooperation between members of the community. A farmer may use any or all sources of labour on the farm, depending on the situation. The total effort from labour is made up of people, skill and time available.

*Farmers
must use the
resources
they have
in the best
possible ways*

Capital

Land and labour can often be made more productive if land is improved. Sometimes land is cleared, cultivated, irrigated or drained. The supply of water can be increased by the construction of dams, storage tanks and canals. These improvements on the land require capital. Capital* is simply a resource that is produced as a result of human effort. Capital includes buildings, dams, roads and machinery as well as inputs and materials. It can be divided into two types: *durable* and *working capital*. Durable capital is made up of items that last for a long time, such as machinery, equipment and buildings. Working capital consists of the money used to buy stocks of inputs and materials, such as seed and fertilizer, that are generally used within a season, as well as other items of expenditure paid in advance of income earned, such as wage bills, maintenance and repairs.

***Capital
is essential
to operate
and expand
a farm***

Capital is used by all farmers, but small-scale farmers often have very little cash capital. Most of the capital found on their farms is in-kind. This includes livestock, tools and equipment, buildings and land improvement measures as well as stocks of seed, fertilizer and animal feed.

Capital is often referred to as assets.

Assets can also be divided into
CASH and **PHYSICAL** forms of capital

* Note that there is a difference between the concept of capital as used in economics and the more common usage where "capital" is often used to refer to the amount of money that people have.



FARM ENTERPRISES

Most farmers have a range of different products that they can produce. These might include crops such as paddy, maize, cotton and groundnuts as well as cattle, poultry, sheep and goats. The different products are known as farm enterprises. Each farm enterprise uses inputs to produce outputs. Inputs are the things that go into production: the use of the land, farm and family labour, hired workers, seed for crops, feed for animals, fertilizers, insecticides and other supplies, tools and implements, draught animals and tractors. Outputs are the crops and livestock products themselves. They are the products of the enterprise. The relationship between inputs and outputs determines what the farmer produces. Economists call this relationship the production function.

**Farm enterprises
are the products
farmers produce ...**

... they require inputs ...

**... the relationship
between inputs
and outputs
determines what
farmers produce**

*Farm enterprises can be divided into
competitive, supplementary and complementary*

Competitive enterprises

Enterprises are said to *compete* when they use the same resources. For example, if a farmer doesn't have enough labour to harvest two different crops at the same time, the output of one crop can only be increased if the other is reduced.

Supplementary enterprises

Enterprises *supplement* one another when they use resources that might otherwise not be used. For example, if a farm is located in an area that has early and late rains it may be possible to grow one crop to make use of the early rains and a second crop that makes use of the late rains. The resource, water, is not left unused. The two crops do not compete for water because they require the resource at different times of the year. These two enterprises are supplementary.

Complementary enterprises

Enterprises *complement* one another when they interact in a supportive way, such as where poultry produces manure. The manure can be applied as a fertilizer to crop enterprises. Similarly, poultry or animals can be fed the crops produced. This relationship between the livestock and crop enterprises shows that the two are complementary.

ENTERPRISE COMPARISONS

Competitive enterprises use the “same” resources

On her three hectares of land a farmer grows maize, beans and pumpkins which use many of the same factors of production.

Introducing a new crop will mean that one or more of her current enterprises will have to be reduced or not planted at all.

These enterprises are competitive.

Supplementary enterprises use “otherwise unused” resources

The farmer allows her cows to graze on land she cannot use for growing crops. She does not feed her chickens excessively and allows them to scavenge for feed so they do not use other food resources that may be used profitably elsewhere on the farm.

These are supplementary enterprises.

Complementary enterprises “support one another”

The farmer collects chicken and cow manure to use as fertilizer on her beans and pumpkins.

She also uses maize harvest residues and by-products to feed her chickens and cows.

These enterprises are complementary.



COST OF PRODUCTION

Cost of production refers to the value of the inputs involved in the production of crops and livestock. For the purposes of farm management it is useful to divide costs into two kinds: *variable costs* and *fixed costs*.

Variable costs

Costs vary according to the size of the enterprise, the amount of inputs used, and the yields achieved. If the area of land under a particular crop increases or more inputs are applied, then variable costs also increase. If less land is planted or fewer inputs are used, the variable costs decrease.

Variable costs apply to specific farm enterprises and vary with changes in production

Examples of variable costs

A farmer has to hire labour for weeding and harvesting. If the farmer increases the area that needs to be weeded or increases the number of times the land is to be weeded, the cost of hired labour will also increase. Similarly, the amount of labour needed for the harvest is linked to the yield.

**If a low yield is attained
the amount of hired labour
at harvest time will also be low.**

**If a high yield is attained
the labour costs will be higher.**

The same is true of other inputs. If the farmer decides to increase the amount of land planted to maize, the amount of seed and fertilizer applied will increase, so increasing the farmer's costs.

Fixed costs

Costs which can be termed fixed usually apply to a specific enterprise and they do not vary with changes in production. These costs include the costs of using a tractor, farm equipment and draught livestock as well as payment for permanent labour.

Examples of fixed costs

A farmer has a small storeroom for fertilizer, seed, animal feed and farm tools. Any costs associated with the storeroom (e.g. maintaining or cleaning it) are shared by all of the farmer's enterprises. These costs are not affected by production or yield. Whether production is increased or decreased, or the yield is high or low, the costs are fixed. It would be difficult to divide such costs and allocate them to the farmer's individual enterprises.

* * *

Concerning draught power and equipment, most of the costs of keeping a tractor, draught cattle and farm equipment remain the same whether the item is or is not fully used. A tractor can be used for a mix of farm operations, cultivating a crop, transporting feed for livestock and even transporting people to town (although this is a very expensive form of transport). The cost for different activities cannot be easily allocated to any one enterprise. Portions of fixed costs, such as fuel or hours of draught animal use, can be allocated between enterprises but this usually requires good information, which is often unavailable to smallholder farmers.

***Fixed costs
apply to the farm
as a whole and
remain steady
as production
changes***

For the most part, fixed costs only become important in more commercialized agriculture when farmers have mechanized equipment. Smallholder farmers usually have few fixed costs. Most often they need not worry about allocating fixed costs between enterprises. Practically all their costs are variable costs.

OPPORTUNITY COST

There is another cost that is often overlooked but is important in economics: opportunity cost. We have mentioned before that, because resources are limited, when a decision is made to allocate resources something else has to be given up. If a farmer spends money on buying tools, he or she will have less money to spend on other items. In all aspects of life, having one thing often means going without another. And there is a cost to giving something up.

The income lost by using scarce resources for one purpose instead of another

An example of an opportunity cost

A farmer grows maize and earns \$55. If the farmer had grown tomatoes instead of maize earnings may have been \$95*.

The opportunity cost of growing tomatoes is the \$55 that was lost (given up) from not growing maize

In both situations the farmer would have made money, but the point is that more money would have been made from tomatoes than from maize.

The concept of opportunity cost can also be applied to labour. The cost of hired labour is very easily measured by the wage paid. *But how is the time of farmers and their families valued?* It is done by deducting the value of the time they are absent from other activities. As an example, a farmer works part-time in town and decides to take a day off in order to work on the farm. The farmer

* Throughout this guide the dollar (\$) sign is used to indicate a monetary unit, not a particular currency

will be giving up a day's wages from the other job. This cost is just as real as paying a hired labourer to do the work. Another example concerns time available to farmers. Where time is spent on a farm enterprise it is not available for social or leisure activities so there is an opportunity cost also associated with non-business activities.

There is also an opportunity cost of capital. *If a farmer allocates scarce financial resources to a farm enterprise, is this the best use of that money?* Perhaps the farmer would have made more money by leaving the cash in the bank and earning interest. Perhaps the satisfaction would have been maximized by adding a new room to the family house.



VALUE OF PRODUCTION

Once a crop has been harvested, the farmer (and family) can do three things: sell it, consume it, or store it. The value of production is the money received from the sale of produce together with the value of produce that is consumed and stored (i.e. unsold produce). It is sometimes referred to as the "value of output".

The value of sales is very easily measured by the amount of money the farmer receives. This is calculated as the quantity of production sold multiplied by the price that the farmer receives.

$$\text{Value of production sold} = \text{Quantity sold} \times \text{Sales price}$$

Production consumed and crops stored make up part of the family's income

As noted before, the value of production also includes the value of unsold produce. This is produce consumed by the farm family or stored. A convenient method of valuing produce is by using the market price for which the produce could have been sold. A more precise way to measure the value of food produced and consumed by the family is to ask: "What would we have had to pay for the food if we had not produced it?" However, in rural areas there is little difference between selling prices and buying prices and thus the sales value can be used as a convenient approximation. Then, the total value of production includes produce sold, produce consumed by the farmer's family and produce stored.

$$\text{Value of production} = (\text{Quantity sold} + \text{Quantity consumed} + \text{Quantity stored}) \times \text{Sales price}$$

An example of value of production

After the maize harvest a farmer had 50 bags of maize. She sold 10 bags of maize at \$5.50 each and earned \$55. She put 20 in her storage shed; 4 bags for cow feed and chicken feed; 14 bags for her family and 2 to give to a farmer friend.

If the farmer wanted to know the value of her maize production, she would have to add together the bags of maize that she sold in the market, the bags she put in storage and the bags she gave away, and multiply the total by the market sales price.

This would be 50 bags x \$5.50 = \$275



GROSS MARGIN

The gross margin for a crop or livestock product is obtained by subtracting the variable costs from its value of production.

**Gross margin =
Value of production – Variable cost**

*Gross margin
of an enterprise
is a measure
of what that
enterprise
can add to
farm profits*

An example of gross margin

A farmer who produces a crop worth \$600
at a variable cost of \$100
generates a gross margin of \$500 (\$600 – \$100).

Calculating gross margins is essential when deciding between different enterprises. If a farmer wants to know whether to continue with a certain crop or grow another, he or she could compare the gross margins of the two crops. If a farmer changes enterprises, the fixed costs will probably not change. But what will change are the variable costs and value of production. Using a gross margin will help the farmer to see if the change in enterprise will be profitable or not.

*Understanding
the basic economic
concepts discussed
in this chapter ...*



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Using land, water and labour – Mozambique

*... factors
of production
(land, water, soil
labour, capital) ...*



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Better watering for production – Burkina Faso

*... farm enterprises,
cost and value
of production ...*



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A successful pumpkin enterprise – Tuvalu

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Intercropping for better farm profits – Ecuador

*... gross margin,
farm profit and
net income ...*

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Seasonal flooding is a risk to consider – Peru

*... substitution,
efficiency,
and risk ...*

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Good management practices bring high yields and profits – Dominica

*... will add to
the knowledge
needed by
families to deal
effectively with the
management of
the farm business.*

*Farm profit
needs to take
into account
both variable
and fixed costs*

FARM PROFIT

Farm profit refers to the money left over after the variable costs and the fixed costs are paid. Each enterprise has a gross margin, which, as noted before, is determined by subtracting the variable costs of the enterprise from the value of production. The total gross margin on a farm is the sum of the gross margins of all enterprises. But, remember, this does not include fixed costs, which still have to be paid. The money to pay for the fixed costs comes from the total gross margin.

$$\begin{aligned} \text{Profit} = \\ \text{Total gross margin of all farm enterprises} \\ - \text{Total fixed costs} \end{aligned}$$

If the amount obtained by subtracting fixed costs from the total gross margin is positive, there is a profit. If the amount obtained is negative, there is a loss. Because fixed costs do not vary much with changes in production, it is almost always the case that if farmers can increase the gross margin on their farms they will also increase profits. Further, because the smallholder farmer usually has few fixed costs, the total gross margin is almost the same as total profit.



NET FARM FAMILY INCOME

Family labour is an important input for most farmers, particularly when they are running farming systems that are only partially or not at all mechanized. Different enterprises require very different levels of labour input. For example, vegetables require a much higher level of labour input than maize. Therefore, it is unreasonable to compare the gross margin of vegetables with the gross margin of maize without considering the labour required.

In the calculation of the gross margin, the payment for hired labour is already included in the variable costs. However, in many cases, labour on small farms comes largely from family sources. In order to meaningfully compare different enterprises, or technologies relating to the same enterprise, it is necessary to allocate a cost for this family labour. Estimating the cost of such family labour is done by valuing what it would cost to hire such labour instead of using family labour.

Very often, the smallholder farmer should not be as concerned about increasing profit as about increasing net farm family income. This is the farm profit after taking into account the cost of family labour used to generate it. After the farm profit is calculated, family labour costs are deducted.

If the opportunity cost of family labour is low, the net farm family income could be increased by using family labour more intensively in farming operations. Farmers often have to decide between hiring a tractor to speed up cultivation and carrying out farm operations, such as sowing, weeding and fertilizing manually. In a situation where the family has limited work opportunities and the opportunity cost of family labour is low, the gross margins may be increased if much of the work is carried out by the farm family, rather than by hiring a tractor.

***It is important
to take into
account
the cost of
family labour***

***Cash inflow
and outflow
vary greatly
throughout
the year***

CASH FLOW

The cash flow is the flow of money into the farm from sales and the flow of money out of the farm through purchases. Money received from the sale of farm produce is called *cash inflow*. Money paid out for inputs and materials used is called *cash outflow*. The difference between the cash inflow and the cash outflow at different times of the year is known as the *net cash flow*.

Farmers need to consider their likely cash flow on a monthly or quarterly basis in order to know whether they will have sufficient cash when it is required. If the cash inflow is less than the cash outflow at any particular time all cash commitments cannot be covered.

Cash flow is not the same as profitability. Remember, profit is based on the value of production less the variable and fixed costs. However, if the farm family consumes a lot of the produce, it is possible that although the farm is profitable, it may not generate enough cash to cover its cash requirements.

In the previous example on page 25 a farmer produced crops worth \$600 at a variable cost of \$100. There were no fixed costs. Based on this information the farmer has a profit of \$500 ($\$600 - \100).

When we investigate further, however, we find that the farmer only sold produce to the value of \$50. The farmer's family consumed the rest of the produce. Therefore the cash inflow is \$50 and the cash outflow is \$100, which means that the farmer would not have the \$100 needed to cover variable costs unless the farmer had money saved or another source of income.

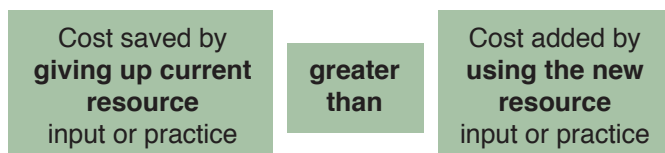
SUBSTITUTION

Because there are many technical ways of producing a crop or livestock product the farmer must choose the method of production that is most efficient. The most efficient method is the one that uses scarce resources wisely. Again, we speak of a choice a farmer must make – the choice between methods of production. *Given the alternatives, which is the best way of producing an enterprise?* The principle of substitution can be usefully applied when farmers consider whether or not to use a new technology or farm practice. As an example, farmers have three alternatives for preparing a seed bed. They can:

- use hand tools
- hire additional labour
- use a draught animal or a small tractor

Which alternative should the farmer use? How can the farmer assess the options wisely? The decision depends on many factors: the size of the farm, whether the farmer has money or needs to borrow money and the cropping pattern. In order to make such a decision the farmer needs to know about the factors of production and their cost for each of the alternative methods. The following simple principle of economics can be applied.

When substituting resources or inputs the farmer must be certain that the savings in the method replaced are greater than the added cost of the new technique or practice.



Substitution requires comparing different methods of production and selecting the best

EFFICIENCY: RETURN TO SCARCE RESOURCES

There are many ways of looking at efficiency on the farm. One useful way is to look at efficiency from the point of view of the factors of production: natural resources, labour and capital. In most cases, one of these factors will be the one that limits profits the most. This is the most limiting factor or the *effective resource constraint*. This really means that the resource is in short supply. The effective resource constraint is used as the basis for examining farm efficiency.

Efficiency

Efficiency is expressed in two forms: *technical* and *economic*. Technical efficiency involves producing farm products with the best combination of resources or inputs. It is expressed as attaining the maximum level of output from a given level of inputs or, alternatively, a given output with the use of minimum inputs. Economic efficiency measures the financial returns on resources used and looks at the cost of using resources to produce a given level of output. Low profitability is often traced to poor efficiency in one or more areas of the farm business.

A farm that is efficiently run is more likely to be profitable than a farm that is not

* * *

Efficiency and land. Land is a natural resource. If it is the most limiting factor, the farmer has no more land to use. If this is the case, the farmer will want to measure efficiency in terms of land by determining the farm's gross margin per unit of land (e.g. hectare or acre) or the profit per unit of land. To improve the efficiency of the farm, the farmer should consider ways to increase yields to try to obtain higher returns from the produce.

Efficiency and water. The most limiting factor may be water. A farmer may consider deep ploughing, which is good to maintain water in the soil. In order to save water the farmer could also construct canals and transplant vegetables on raised beds. In this way the farmer uses less water per hectare and makes more efficient use of this scarce resource.

Efficiency and labour. Assume that labour is the limiting resource. This means that labour is in short supply. When this is the case, the farmer will want to measure efficiency in terms of labour by determining the farm's gross margin or profit per labour input or person-day. To improve the efficiency of the farm, the farmer should look for ways to increase production using the same amount of labour, or produce the same amount using less labour. This can be done by introducing a labour-saving technology that reduces the amount of time spent on farm operations.

Efficiency and capital. Capital is nearly always in short supply and needs to be used efficiently. If capital is the most limiting factor, the farmer will want to measure efficiency in terms of capital by determining the farm's gross margin or profit per unit of capital, such as per \$100 or whatever value is most appropriate. To improve the efficiency of the farm, the farmer would look for ways to increase production, perhaps by investing money in high yielding seeds (instead of ordinary seeds) or by investing money in a more efficient technology.

Efficiency is concerned with the wise use of the resources available



RISK

One of the facts of farming is that many future events cannot be known with complete accuracy or certainty. This makes farming risky. Risk occurs when the outcomes of a decision are not known in advance or cannot always be predicted. Farmers need to make decisions that take these risks into account*.

The most common sources of risks in farming are:

*Risk exists
in many
different
forms ...*

*... and with
potentially
devastating
effect*

- *Production risks*: crop and livestock performance are affected by biological processes (weather, pests and diseases);
- *Marketing or price risk*: market prices vary from year to year or in some situations daily;
- *Financial risk*: when it becomes necessary to borrow money to finance the farm business;
- *Institutional risk*: unpredictable changes in the provision of services from support institutions;
- *Human and personal risk*: risk to the farm business caused by illness or a family situation.

Risk influences the amount of inputs that are used as well as their cost. In rain fed agriculture, for example, farmers may experience poor rains one year in five. They will not risk using large amounts of fertilizer if there is a possibility that the rains won't come. Farm profits are always uncertain. Not all factors have the same effect on the riskiness of farm profits but all must be taken into account. As a result of risk, farmers often have to balance between maximizing profits and minimizing risks.

* Economists often differentiate between risk and uncertainty. Risk is associated with events for which a probability of occurrence can be attached. For example, the risk of no rain in a given period can be calculated, based on past rainfall patterns. Uncertainty, on the other hand, refers to events for which no objective way to assign a probability exists. An example is the prediction of prices. For most practical purposes, however, the two concepts can be used interchangeably.

Chapter 3
Economics and the market

MAIN POINTS IN CHAPTER 3

What is a market?

The place where the exchange of products for money takes place.

Markets are made up of sellers and buyers.

Key concepts • Market • Seller • Buyer • Price •

What is marketing?

Making decisions about the marketing of farm products is an important part of farm management.

To make these decisions, farmers need to understand the market, how it works, how prices are determined.

Key concepts • Marketing • Decision-making • Price •

How does the market work?

Prices are determined by supply and demand.

Supply is the amount available for sale at a certain price.

Demand is the amount people are prepared to buy at a certain price.

Key concepts • Supply • Demand • Equilibrium •

How are market prices determined?

(DEMAND)

The price of the product;

The price of substitutes;

Changes in tastes;

Increases in income;

Changes in population;

Future price changes;

Government policy;

Other factors affecting demand.

Key concepts • Market conditions •

• Price mechanism •

As farmers become more market-oriented they need to understand how prices are determined ...

***How are market prices determined?
(SUPPLY)***

*The price of the product;
The conditions of supply;
Changes in the cost of production;
Change in interest of farmers;
Improved techniques;
Natural resource changes;
Government policy;
Other factors affecting supply.*

***Key concepts • Supply conditions •
• Price mechanism •***

Why do prices vary from time to time?

*Changes in production and demand
at different times of the year.
Availability of competing products and inflation.*

Key concepts • Inflation • Seasonality •

***Why do some prices change sharply
while others do not?***

*The nature of the products.
Whether they are essential or non-essential.
Whether there are substitutes.
Length of time involved
in making changes in production.*

Key concepts • Elasticity • Inelasticity •

*... and acquire an
awareness of
how economic
concepts and
principles relate
to marketing*

***Farmers can improve
the price of their products***

*Premium prices can be attained
if product quality is assured by better
production and post-production processes.
The organization of marketing groups
can also provide negotiating advantages.*

***The key concepts here are quality
and economies of scale.***

ON MARKETING

What is a market?

The word “market” is used in two ways ...

First, it is a place where the exchange of products for money takes place. Markets are made up of *sellers* and *buyers* and their relationship influences the amount of money received in exchange for products. Markets do not have to be physical locations. Exchange can also take place over the telephone and sometimes, these days, over the Internet.

Second, a “market” represents the collective demand for a product. When farmers understand the market for their products, it means that they understand the product that consumers want, how much they want, what price they are willing to pay and what qualities and other conditions they demand. We can talk about commodity markets, maize markets or rice markets in this way.

*Markets
are made up
of sellers
and buyers
expressing
collective
demands
for products*

What is marketing?

Making decisions about the marketing of farm products is an important part of farm management. If farmers are to treat farming as a business they need to understand marketing and how the market works. Marketing is a series of exchanges linking the farmers who produce and sell, and the consumers who buy. Buyers can take different forms. They include:

- Customers who buy for their own use and their families;
- Rural traders who sell the produce to others;
- Processors who transform the produce and then sell it to others;
- Wholesalers who buy and sell to retailers;
- Retailers who buy and sell to consumers;
- Exporters who buy and then sell abroad.

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Although many farmers market their produce locally ...

A local village market – Burundi

© Argent



... or transport their produce to assembly, wholesale or retail markets ...

An assembly market – Pakistan

© FAO/24495/D.White



... more and more the trend is to high-value production destined for sales at supermarkets.

A speciality supermarket – Thailand

Exchange takes place when two sides agree on a price. If they do not agree, no exchange will take place. The exchange mechanism of selling and buying depends on the price. Understanding how prices are set calls for an understanding of how the market works. It also calls for an understanding of the factors that affect supply and demand and cause prices to change. These are all parts of economics.

To make a profit, the farmer has to charge a high enough price to cover more than the costs of production and marketing. While there may be occasional price falls that cannot be foreseen, if these costs cannot be covered in the long run the product should not be produced.

When making plans
a farmer needs to know ...

WHAT PRICES TO EXPECT.

When selling,
a farmer needs to know ...

WHAT PRICES CAN BE OBTAINED.

HOW DOES THE MARKET WORK?

In the simplest situation farmers take their products to markets to exchange them for money. Consumers take their money to markets to exchange it for products. The market sets the price at which those who want a product (buyers) can obtain it from those who have it to sell (farmers).

In a market-oriented system
price is determined by supply and demand

Supply

The amount farmers are prepared to sell.

Demand

The amount buyers are able to buy.

Market price

What both farmers and buyers
are willing to accept.

*When prices
are too high
consumers
will not buy
the product*

*When prices
are too low
producers
may not be
willing to sell*

If supply increases but demand does not increase, the price will fall. This is often what happens in a market at the time of harvest, when there is an abundance of produce for sale and prices are low. Later in the season, when there is less for sale, the price often increases. If demand increases but the supply does not the price is likely to rise. Where a product is scarce consumers are willing to pay more for it. This will push up the price. Fruits and vegetables out of season are examples of scarce products. When the price of a product increases, profits tend to increase, which encourages farmers to produce more. On the other hand, if consumers do not want the product, its price falls and farmers make a loss. Such a situation may lead to farmers producing less of the product

HOW ARE MARKET PRICES DETERMINED?

As noted in the previous section, prices are determined by supply and demand. But what does this really mean?

Supply

Normally, the higher the price of a product, the greater the supply of that product. For example, farmers considering producing tomatoes would be encouraged by high prices. If they do produce tomatoes and the price increases, they would be encouraged to extend the area of land under the crop. They would also try to grow tomatoes with more or better quality inputs so that a higher yield could be produced. The table below shows the amounts of tomatoes that could be supplied at different prices by all producers in the market.

High prices encourage farmers to grow more ...

Tomatoes supplied change with the price

Table 1
Supply
of tomatoes
at different
prices

Price (\$/kg)	Supply (kg)
12	40 000
10	32 000
8	25 000
6	20 000
4	13 000
2	7 000



➡ = point of equilibrium

*The **higher** the price the **greater** the supply*
*The **lower** the price the **less** the supply*

Demand

The demand for a product normally rises when its price is lower. If the market price is high, consumers reduce their purchases. The table below shows the amount of tomatoes in demand at different prices. If tomatoes are very expensive, consumers may substitute other vegetables. If they are cheap, consumers will buy more.

*... but high prices
also encourage
consumers
to buy less*

Demand for tomatoes changes with price

Price (\$/kg)	Demand (kg)
12	3 000
10	9 000
8	15 000
6	20 000
4	25 000
2	35 000

*Table 2
Demand
for tomatoes
at different
prices*

← = point of equilibrium

*The **lower** the price the **higher** the demand
The **higher** the price the **lower** the demand*

Market price

The market price is set at a point where supply and demand are in balance. Economists call this the equilibrium price. That is the point where the amount in demand matches the amount supplied.

*From the tables of demand and supply for tomatoes
the equilibrium price is \$6 per kg
This price is the only one where there is
balance between buyers and sellers*

***At this price 20 000 kg of tomatoes
are both in demand and offered for sale***

**The equilibrium price
can also be plotted as shown below**

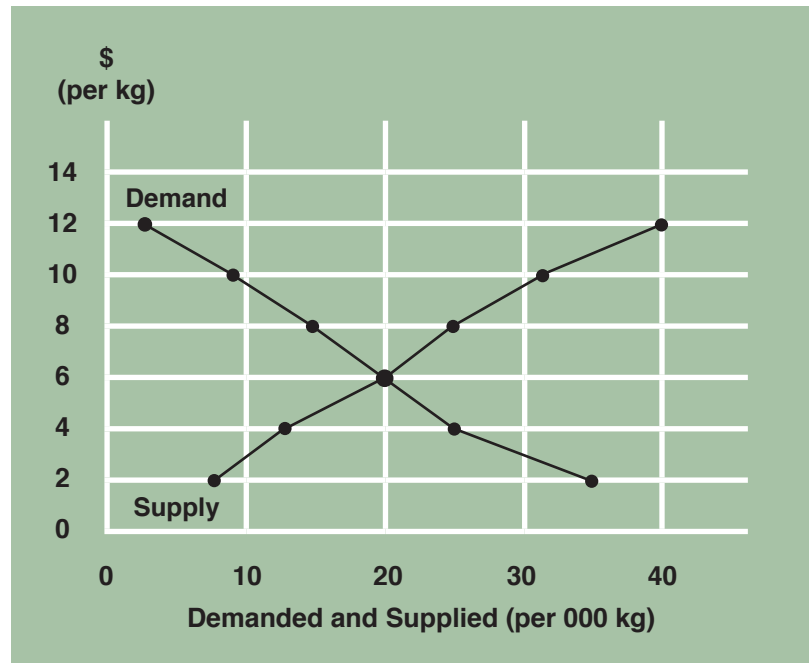


Figure 1
**Market price
determination
for tomatoes**

Suppose that initially the price of tomatoes is set at \$8 per kg. At that price 15 000 kg of tomatoes would be in demand and 25 000 kg for sale. There would be an excess supply of 10 000 kg of tomatoes over the demand. This means that farmers would be left with a surplus that could only be cleared once the price was reduced. As the price falls, demand gradually expands and supply slowly contracts until a price of \$6 per kg is reached. There is then no need for the price to fall further.

Similarly, if the initial price is \$4 per kg, 25 000 kg of tomatoes will be in demand but only 13 000 kg offered for sale. Consumers might even form queues to buy tomatoes. The price would then rise, giving an incentive for farmers to plant more. At \$6 per kg there is no need for prices to rise further.

This is called the price mechanism. It indicates the wishes of consumers and allocates productive resources accordingly.



WHY DO PRICES CHANGE?

As we have discussed, prices change depending on changes in supply and demand. As a result of such changes equilibrium prices and production levels also change. The farmer needs to recognize such changes and adjust the farm business to them.

*The following factors
influence production or supply*

Seasonality of production. At peak season crops are more abundant than they are during the off-season.

Changes resulting from climate. Supply also varies from year to year. Changes in production frequently occur as a result of weather (including rainfall, floods and drought). Bad or good climatic conditions can decrease or increase the quantity supplied. Bumper harvests usually decrease prices, poor harvests usually increase prices. In these cases, the level of production is not affected by the price of the product but by climatic changes.

Production problems. The incidence of pests, diseases and other hazards, such as fire, can decrease the supply.

Change in the cost of production. A decrease in the cost of inputs or the introduction of more efficient technologies would decrease the cost of production. This makes it possible for the farmer to buy more inputs and produce more for the same cost of production. As a result more tomatoes could be supplied at the old price. Conversely, an increase in the cost of labour employed on the farm would have the opposite effect.

Improved techniques. The introduction of high yielding varieties could increase the level of production, resulting in a decrease in product price.

*Supply or
production may
be influenced
by other factors
as well as price*

Expansion of a crop under cultivation. Farmers may decide to plant more of a crop because of the prospect of greater profits.

Changes in profitability of competitive products. Changes in the profitability of competing products also cause a change in supply. If cabbage is more profitable than tomatoes, for example, farmers will gradually shift towards growing cabbages. This change would lead to a decrease in the supply of tomatoes.

For fresh produce, such as vegetables, there are often short-term fluctuations in supply, sometimes a result of bad weather which can affect the harvest. There may also be transport disruptions.

*The following factors
affect the demand for a product*

A change in the number of consumers. Extra people coming into a market can increase demand. Development projects, housing developments and other programmes often cause people to move to a new area.

A change in consumer demand. Changes may occur that make consumers demand more or less of a product at each price. In other words the level of demand could change. For example, farmers could join together to promote their sales of tomatoes. They might advertise the good quality, freshness and availability at times of the year when tomatoes are not usually found in the market. This may appeal to consumers, increasing demand.

An increase in income. As countries get richer there will be a general increase in income and people will be able to afford new products. As people become richer they tend to reduce their consumption of staples, such as rice and maize, and increase consumption of dairy products, fruits and vegetables.

*Demand
for a product
may also be
influenced by
factors other
than price*

A change in the prices of products that are close substitutes. In some diets spinach may be a substitute for tomatoes. If the price of spinach decreases, consumers may prefer to purchase it instead of tomatoes. Thus, even though there may have been no change in the price of tomatoes, the demand could decrease.

Availability of competing products. If a wider range of products competing with tomatoes comes onto the market, consumers have a wider choice. This may lead to a lower demand for tomatoes. However, a lower demand may lead to lower prices, which could cause demand to increase again.

A change in taste. A promotional campaign aimed at persuading consumers to purchase more of a product could also increase the demand. Similarly, changes in demand may come from changes in consumer tastes that take place gradually as a result of changes in diet.

Safety concerns. Quickly spreading consumer fears of contamination, as experienced in the Avian Flu epidemic, can have an immediate effect of decreasing demand.

Expectations of future price changes or shortages. The fear that the price of a product could rise considerably the following week, for example, because of a planned transport strike, would motivate people to increase their demand and stock up. Clearly, this would not happen so much with perishable products.

The relationship between supply and demand and prices of products is thus extremely complex. A change in the price of one product can affect the demand and, in turn, the price of an entirely different product. Supply is, however, likely to fluctuate much more than demand. Market prices are affected more by changes in production than by changes in demand.

Prices are also affected by what is called *inflation* which is the general increase of all prices throughout the country. Farmers cannot do anything directly about this. High inflation means that prices rise rapidly. Inflation affects both the price of inputs (seed, fertilizer, labour) and the price of products. For example, a bag of fertilizer which cost \$10 last year may cost \$15 a year later. Similarly a kilogram of tomato that sold for \$4 last year may now be sold for \$5. Farmers must be aware of inflation and its impact on farm input and market prices.

CAN FARMERS SET THE PRICES FOR THEIR PRODUCTS?

In most cases, farmers do not set their own prices, they must accept the going price. They are called “price-takers”. Farmers generally grow products that are very similar to those that other farmers grow. If a farmer were to charge too high a price traders and consumers would refuse to buy the product. By lowering the price, the farmer adjusts it to the market conditions.

However, there are some situations where farmers may be able to influence the market price. In such situations they are called “price-makers”. This sometimes occurs when there are only a few farmers producing for a “niche market”. A niche market is a highly specialized market or when produce is produced at a specific time of the year when premium prices can be obtained. Being price-makers gives farmers a great advantage when it comes to negotiating with traders responsible for distributing their produce.

WHY DO SOME PRICES CHANGE SHARPLY WHILE OTHERS DO NOT?

Normally, demand increases as prices fall and supply increases as prices rise. More people are interested in buying products that have a low price. Farmers are interested in increasing their production to follow higher prices.

However, the supply of some products can be adjusted far more quickly than the supply of others. For example, the supply of mushrooms and tomatoes can be increased or decreased quickly in response to price changes. But other items such as fruit, coffee, tea and milk take longer to adjust. If the prices of such commodities fall, the decrease in supply does not come about immediately. First, changes in production would require significant changes, such as uprooting tree crops. A farmer would need to think through such changes very carefully. Second, even if the farmer were to make the required changes, it would take a long time for overall production to adjust.

Elasticity

Elasticity is an economic concept that can help explain changes in product prices, supply and demand. It can especially help to explain why changes are more significant for some products than for others. Different products have different elasticities.

When supply or demand change a lot in response to a change in price, the product is said to be *elastic*. It is sensitive to price changes. When supply or demand does not change much in response to a change in price, the product is said to be *inelastic*. It is insensitive to price changes.

To maintain profits farmers need to understand how markets function ...

... and acquire the knowledge and skills necessary to respond to price changes

Salt is an example of an inelastic product. The demand for salt would change only by a small amount if there were a change in the price. There would have to be a very large change to cause a noticeable change in demand, because salt is both a very small expense for most families and a product for which consumption cannot be easily reduced and for which there are no significant substitutes. On the other hand, vegetables are generally elastic products. When prices change, supply and demand adapt relatively rapidly.



CAN FARMERS IMPROVE THE PRICE OF THEIR PRODUCTS?

The *quality* of a product influences its market price. Consumers pay more for a product that is clean and free of dirt, insects and damage. Large eggs sell for a higher price than small eggs. Fat animals sell for a higher price than thin ones.

***The quality
of a product is
as important as
supply and demand
in setting the price
of produce sold***

Farmers can improve the quality of crops and livestock by using better production and post-production practices. Using different breeds or varieties and improving practices on the farm can increase returns. By improving post-harvest handling practices, farmers will ensure better quality and could obtain higher prices. However, in order to make these improvements, it is sometimes necessary to make special efforts that may involve extra costs. These extra costs have to be covered by an increase in money received for the higher quality product. Examples are shown on the next page.

*Actions farmers can take
to improve the price of their products*

Improved production

Large eggs and creamier milk, for example, will bring higher prices compared with small eggs and milk with a lower cream content. But it is important that farmers consider the extra costs involved in the production change and compare them with the extra money that improvement will bring. If the profit is higher than that previously obtained, the extra effort will be worth it.

Organize marketing groups

Farmers acting alone to improve their prices may not gain. A single farmer improving quality will have to sell to the same trader as all other farmers. The trader will probably not pay a premium as it will not be possible to keep good quality and poor quality produce of different farmers separate.

However, farmers working together can often increase their bargaining power. This helps them to deal with buyers and negotiate contracts. Marketing groups may also be in a position to offer their members other benefits such as better market information.

Farmers acting in groups may also be able to improve packaging. In some countries, working together has successfully increased prices by using a brand name or by stressing the geographical origin of the product. Farmers in groups can also work with retailers to ensure that produce reaches the store quickly and can thus command a premium for “freshness”.

Economies of scale

Scale is used to describe differences in the overall size of farms or businesses. Economies of scale are achieved when the cost per unit of production or output marketed is reduced as the scale of the activity increases. Savings (economies) can be achieved by spreading costs over a larger scale of operation. They can also be achieved when farmers organize themselves into groups to buy

*Farmers
in groups can
often influence
the prices of
produce sold
for the better*

inputs, use capital or market produce. These group activities can bring about a cost reduction per unit of inputs purchased or produce marketed.

Economies of scale can also come about through specialization. As output of one product increases there is a possibility of using more specialized management and introducing mechanization to take the place of labour in field operations. Increases in scale of output allow savings to occur in the time spent on these tasks.

The following are examples of some of the economies that can be achieved when working at a higher level of marketing and input purchases.

- Groups of farmers involved in marketing could share transport arrangements to sell their produce. This very often results in lower unit costs. If each individual farmer were to transport produce separately the amount of produce transported would be smaller and per unit transport costs would be higher than those of the collective effort.
- Farmers can look for ways to produce collectively. They could share a tractor, infrastructure for livestock production or mechanical harvesting.
- Collective buying of inputs could also result in economies of scale. By ordering in bulk, the farmers would be able to buy their materials at reduced prices and transport them more cheaply.

Chapter 4
**Economics and
farm management decisions**

MAIN POINTS IN CHAPTER 4

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

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.

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.

***Farming for
profit requires
economic data
and information***



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?*

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.

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

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.

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

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

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.

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?

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.

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

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



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	
<i>Sales of farm products</i>					
Maize	250		300		Inflow (\$)
Milk			60	60	
Chickens	130				
Planned sale of tomatoes		60	120		
Total cash inflow (A)	380	60	480	60	
<i>Purchase of inputs</i>					
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

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Hand tools, watering can and wheelbarrow – Burundi

*Investments
with long-term
consequences ...*

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Handheld tractor – Nepal

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

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

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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:

$$\text{Depreciation} = \text{Purchase price} \div \text{Life of item}$$

So, $\$200 \div 5 \text{ 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?

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.

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,

Decisions on buying assets are important ...

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

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
	\$770

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 .

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.

Box 3
**Guidelines
for assessment**

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.

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

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

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.

Chapter 5
Summary



FINAL POINTS

As an extension worker, you have an important role to play in supporting farmers in their marketing and production decisions. You are in a position to guide them away from traditional farming practices towards a more market-oriented approach to farming.

Farmers need assistance to ensure that their produce satisfies the consumer. This calls for improved farm management skills so that farmers can better select new opportunities and have an understanding of how to deal with the market. The principles of economics as discussed in this guide have been prepared to assist you to understand some of the dilemmas facing farmers and ways that these problems can be addressed. An overview of the main economic concepts and principles follows.

- **Maximization of profit or satisfaction**
- **Variable and fixed inputs**
- **The margin**
- **Diminishing marginal returns**
- **Substitution**
- **Opportunity cost**
- **Efficiency: return to scarce resources**
- **Comparative advantage**
- **Economies of scale**
- **Supply and demand**
- **Elasticity**
- **Farm profit**
- **Net farm family income**
- **Optimum level of output**
- **Cash flow**
- **Depreciation**
- **Salvage value**
- **Return on capital**
- **Risk**

Maximization of profit or satisfaction

It is generally assumed that farm businesses are planned for the maximum profit consistent with good husbandry. However, when objectives other than profit maximization are considered, such as the satisfaction of family interests, reduction of risks, or increased leisure, which might reduce the potential profit, the costs of meeting these objectives also need to be considered. Economic principles should be used to indicate the best allocation of resources for attaining the chosen objectives.

Variable and fixed inputs

The distinction of farm resources between variable and fixed inputs underlies much of the economic thinking about farm production. Variable inputs are those that change with the amount of output over a given period (e.g. fertilizer, seeds, pesticides, fuel, harvest, labour). Fixed inputs are those that remain the same regardless of the volume of the output actually achieved (e.g. land rent, labour required for cultivation irrespective of final yield, livestock, tools, machinery, buildings). The same distinction lies between costs that vary with output and fixed costs that are incurred irrespective of the level of output.

The margin

This is the added output, input or value (cost of product). It is measured either in physical (production) or financial terms. The marginal product per unit of input reflects to the yield added to the total production by adding one more unit of input. Similarly, the marginal value of production 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 value of an added input.

Diminishing marginal returns

The principle of diminishing marginal physical and financial returns is vital to understanding farm production economics. It is the use of the concept of diminishing returns that determines the best level for any production practice or activity on the farm.

Substitution

The principle of substitution applies whenever farm output can be produced by different combinations of inputs or different methods of production.

Opportunity cost

This principle notes that by transferring resources from one activity to another there is a cost that is often not measured. This is the income lost as a result of reducing the level of output from which resources are withdrawn. The strict definition of opportunity cost is the maximum income that the resource(s) could have given in an alternative use.

Efficiency: return to scarce resources

Farm efficiency is concerned with the wise use of the resources available to the farmer. One way to look at efficiency is from the point of view of the factors of production (i.e. natural resources, labour and capital). In most cases, one of these factors will be the one that limits profits the most. This is the most limiting factor or the *effective resource constraint*.

Comparative advantage

This principle refers to the distribution of physical resources, over space. That is, the best use of land in different locations for the production of different crops and livestock. It suggests that for greatest efficiency farm activities should take place in those locations where the factors of production (climate, soils, terrain, labour availability) provide advantages of the lowest costs compared with other sites.

Economies of scale

Economies of scale are achieved when the cost per unit of production or output marketed is reduced as the scale of the activity increases. Savings (economies) can be achieved by spreading costs over a larger scale of operation. Economies of scale can also be achieved among farmers when they organize themselves into groups to buy inputs, obtain capital or market produce.

Supply and demand

A market exists when buyers wanting to exchange money for goods or services are in contact with sellers wanting to exchange products or services for money. A market is made up of people who use, need or want a product and who have the money to buy it. Prices are set by producers and consumers coming together to exchange goods and services.

Elasticity

This is an economic concept that explains changes in product prices, supply and demand. It explains why the prices and quantities of some products supplied and demanded can vary more significantly than others. When the price of a product changes, the supply and demand for that product also change. The degree of change in the demand and supply in response to a change in price is called elasticity. Different products have different elasticities.

Farm profit

Farm profit refers to the money left over after paying for the variable and fixed costs. If the difference is positive, that farmer is making a profit; if the difference is negative the farmer is making a loss.

Net farm family income

Net farm family income is a concept that takes into account the value of family labour in calculating profit. The cost of family labour is done by valuing what it would cost to hire that labour instead of using it in production. After farm profit is calculated, family labour costs are deducted.

Optimum level of output

This concept explains how much of each resource a farmer should apply. The decision is based on the comparison of the costs and returns. The point of optimum level of output is where the value of the marginal product is just sufficient to cover the cost of the resources used.

Cash flow

Cash flow is a concept used to assess if the farmer has sufficient money available to make changes to the farming system. This may involve a change in farm enterprise composition or alternatively purchasing a capital asset, as examples. The cash flow enables the farmer to identify the time of the year when additional financial resources may be required. It is made up of the flow of money that comes into the farm from sales and the flow of money that leaves the farm through purchases and expenditures. The net cash flow is the difference between the cash inflows and outflows. The cash flow can help the farmer determine the financial performance of the farm as a whole.

Depreciation

Depreciation is a concept used to assess the loss of value of an asset over time. This occurs as a result of the asset being used or because it eventually becomes obsolete. As time proceeds there will always be a need to replace an asset.

Salvage value

Assets have a given life expectancy. The concept of salvage value expresses the value of an asset that is unused at the time that it is sold.

Return on capital

Return on capital is a concept used in economics to decide whether or not to buy a fixed asset such as machinery, equipment, an animal or establish a tree crop. These are all long term investments. The return on capital expresses the profit expected from the investment related to the capital required. It is expressed as a percentage rate of return on the cost of capital.

Risk

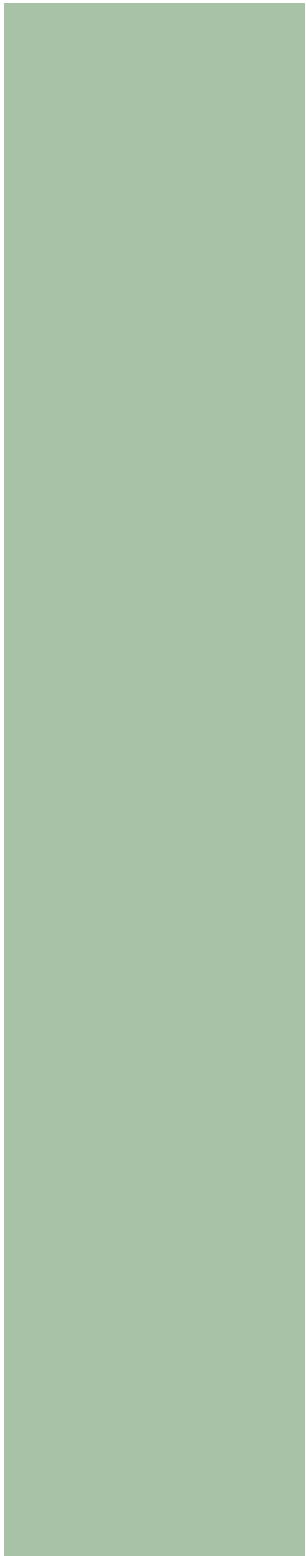
The concept of risk reflects the fact that future events cannot be known with complete certainty. Risk occurs when the outcome of a decision is not known in advance or cannot always be predicted. These risks need to be taken into account by farmers when making decisions.

Glossary

Assets	Items of capital owned by the farmer.
Capital	Items produced as a result of “human effort”.
Cash flow	The flow of money into the farm from sales and the flow of money out of the farm through purchases.
Competitive enterprises	Farm enterprises for which the output level of one can be increased only by decreasing the output level of the other.
Complementary enterprises	Enterprises for which increasing the output level of one also increases the output level of the other.
Cost of capital	Payment of interest for capital investments.
Demand	The amount buyers are willing to buy at a particular price.
Depreciation	The loss of value of an asset over time, either because it is being used or because it will eventually become obsolete.
Efficiency	The wise use of the resources available to the farmer.
Factors of production	The resources needed for production.

Farm enterprises	The range of products produced on a farm.
Farm profit	The money left after the variable costs and the fixed costs have been paid.
Fixed costs	Costs that do not vary with changes in production.
Gross margin	A measure of what the enterprise is adding to farm profits. The gross margin for a crop or livestock product is obtained by subtracting the variable costs from the value of production.
Inputs	Items that are used for production.
Investment	Money used to purchase a capital item that provides future benefits.
Labour	The work of farmers, their family and hired labourers; human effort.
Market	A place where the exchange of products for money takes place.
Market price	The price that both the buyer and the seller are willing to accept for the product that is being exchanged for money.

Marketing	A process by which produce produced by farmers reaches consumers.
Natural resources	“Gifts of nature”, including land, water, soil and rainfall.
Net farm family income.	The net farm income after taking into account the cost of family labour used to generate it.
Opportunity cost	The income that could be received by employing a resource in its most profitable alternative use.
Outputs	The crops and livestock produced.
Production function	The relationship between inputs and outputs.
Rate of return	The increase in profit as a percentage of the capital cost of the investment required to increase the profit.
Risk	A situation in which more than one possible outcome exists, some of which may be unfavourable.
Salvage value	The market value of a depreciable asset at the time it is sold or removed from service.



Supplementary enterprises

Farm enterprises that use resources that might otherwise not be used “supplement” one another. An example of a supplementary enterprise is intensive livestock such as poultry or pig – that has no significant demand on land as a resource.

Supply

The amount that farmers are prepared to sell at a particular price.

Value of production

The money received from the sale of produce together with the value of produce that is consumed and stored.

Variable costs

Costs that vary according to the size of an enterprise and the amount of inputs used.

Working capital

Working capital consists of the money needed to buy stocks of inputs and materials and items of expenditure paid in advance of income earned.

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