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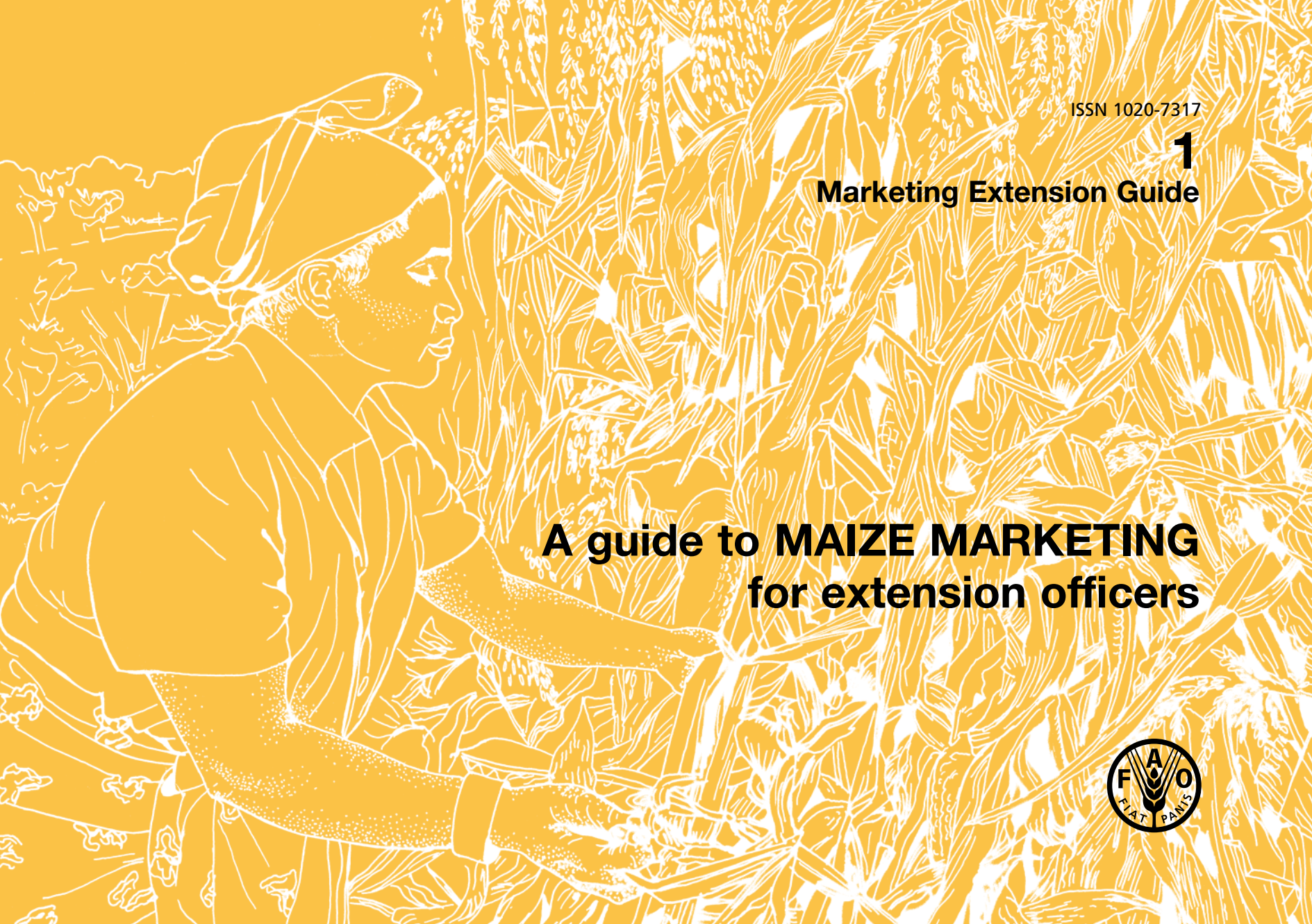
Marketing Extension Guide

A guide to MAIZE MARKETING for extension officers



For further copies of this publication
and for information on FAO's activities
related to agricultural marketing
please contact:

Market Linkages and Value Chains Groups
Rural Infrastructure and Agro-Industries Division (AGS)

Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome, Italy

FAX: (+39-06) 57053057
E-mail: AG-Registry@fao.org

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Marketing Extension Guide

A guide to MAIZE MARKETING for extension officers

Revised edition

by
Andrew W. Shepherd

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Foreword

Agricultural production can only be really efficient if the accompanying marketing and post-harvest systems are also efficient. Well-functioning marketing systems are thus essential to develop production, so increasing farmers' incomes and promoting food security. Extension workers can play an important role in ensuring that the marketing systems work to the benefit of farmers and consumers.

In the past two decades countries in Eastern and Southern Africa have gradually moved to a system where private traders buy crops from farmers, transport those crops to the cities and sell them to processors, millers and consumers and away from a system that involved marketing boards. These changes mean that extension workers have had to develop new skills in order to advise farmers on what crops to grow, on how and where to sell their crops and on how to store their crops. They need to be able to answer farmers' questions about prices, about whether to store their crops or sell immediately and about where to buy and how to pay for inputs such as fertilizer and seed.

This Guide provides extension workers with basic information on private-sector grain marketing systems and on crop drying and storage. Emphasis is on maize, but other crops are also briefly considered.

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Acknowledgements

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AWS

Introduction

This Guide has been designed to assist extension officers in their work with small-scale farmers

In much of Africa in the 1990s, changes were made to marketing arrangements for food crops, most notably maize. Marketing boards and, in some cases, cooperatives were abolished, or their crop procurement and handling functions radically reduced. Private traders were expected to buy crops from farmers, transport those crops to the cities and sell them to processors, millers and consumers. In most countries, government-owned mills and agro-processing industries were also sold to the private sector.

Changes to the marketing system meant that field-level extension workers had to develop new skills. Prior to the 1990s, they did not really have to concern themselves with grain marketing. The marketing board or cooperative received the farmers' maize at warehouses or other buying points and, sooner or later, the farmers were paid. In some cases, the provision of credit was tied in with crop marketing, so that the marketing board deducted credit repayments from the money owing the farmers for their maize, and returned them to the bank. Extension workers may have been called upon to advise on the creditworthiness of farmers but rarely had to worry about helping farmers market their crops, as there was only one marketing channel available.

In the 21st Century, farmers can no longer rely on finding a willing buyer at a marketing board or cooperative depot. Instead, they now have to look for buyers and hence need an understanding of the way the market functions and of prevailing market conditions. When crops are in surplus, farmers cannot even be sure of finding buyers. Under the old system, marketing boards usually bought the maize soon after harvest. Under the present system, traders will usually only buy to meet their immediate sales requirements. This means that farmers will have to store the maize they plan to sell for much longer than before. Under the old system, there was usually just one buying price, which applied to all the country throughout the year. Under the new system, prices vary according to the location and season. Even at the same location, the prices offered by different traders may vary noticeably.

It is, therefore, necessary for extension workers to assist farmers by advising them on what crops to grow, on how and where to sell their crops and on how to store their crops. They need to be able to answer farmers' questions about prices, about whether to store their crop or sell immediately and about where to buy, and how to pay for, inputs such as fertilizer and seed.

This Guide provides extension workers with basic information on how maize marketing systems work and on crop drying and storage. It can, however, only provide general background information, as conditions vary in each country. For example, extension workers will be able to use the Guide to help them understand

why prices for maize vary, but for specific information on prices they will need to contact national information sources. The Guide should help extension workers to work out whether farmers should invest in new types of stores, but specific information on the most appropriate storage techniques for a particular area will have to be obtained from national Ministries of Agriculture.

Note: This Guide concentrates primarily on maize, since in most countries of the region that is the most important crop. Other crops will also be considered. Chapter 6 briefly looks at diversifying out of maize into other crops and considers marketing and processing arrangements for those crops.

Box 1

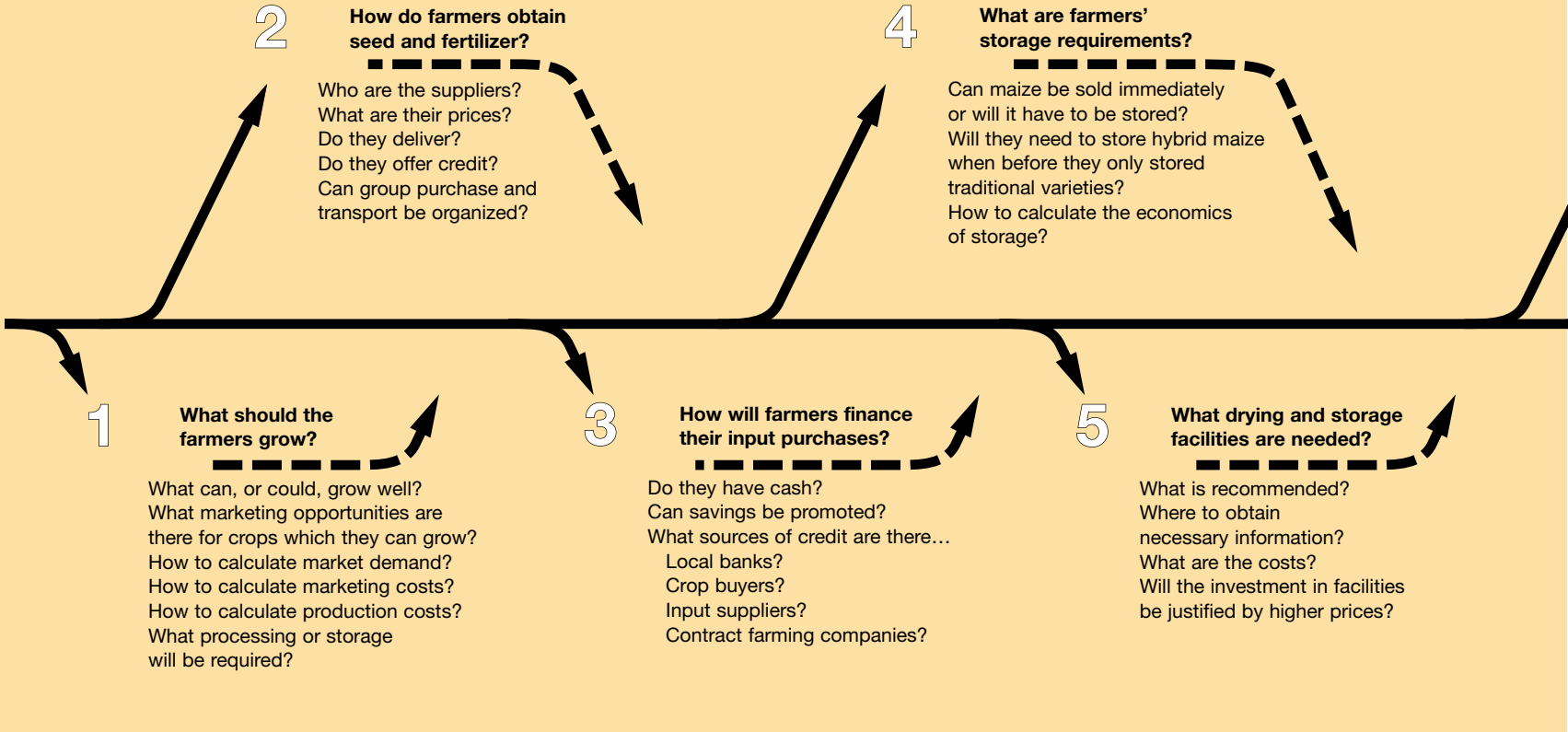
The role of the extension worker in a grain marketing

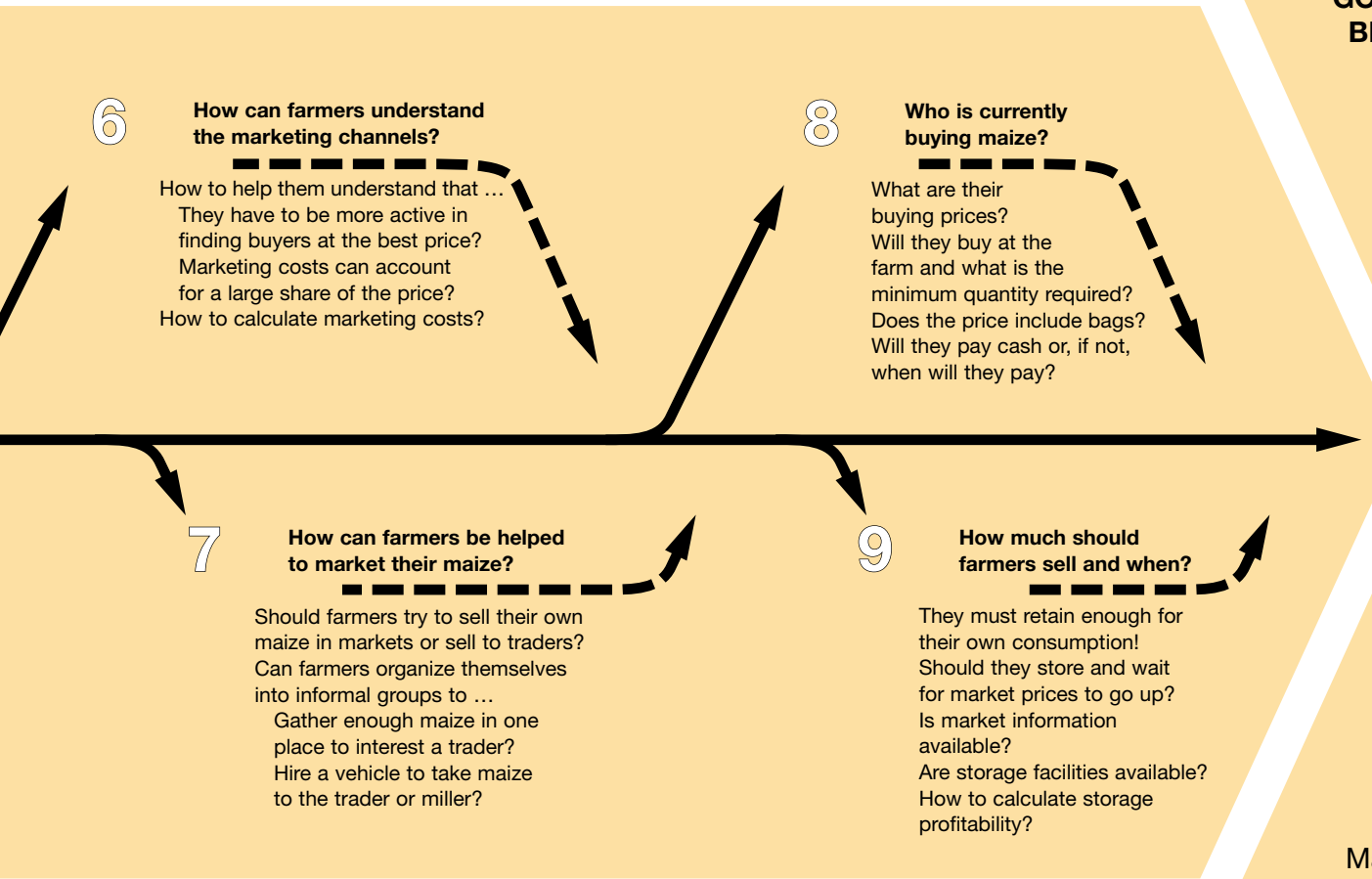
Some of the questions the extension worker will have to be prepared to answer …

1. **What should the farmers grow?**
2. **How do farmers obtain seed and fertilizer?**
3. **How will farmers finance their input purchases?**
4. **What are farmers' storage requirements?**
5. **What drying and storage facilities are needed?**
6. **How can farmers understand the marketing channels?**
7. **How can farmers be helped to market maize?**
8. **Who is currently buying maize?**
9. **How much should farmers sell and when?**

Decisions of what to do and exactly when to do it often must be made early enough in the season to allow correct actions later. For example, if farmers choose to grow a different crop, where will they get the required inputs, what type of storage will they need and how will they find suitable market outlets? The diagram on the next two pages helps to outline this process.

Questions along the production and marketing chain that must be answered in a timely fashion





GOALS TO BE ACHIEVED

Helping farmers to understand the new system…

Ensuring that they know about other crop opportunities…

Ensuring that farmers can get, and pay for, the necessary inputs…

Helping them to sell their maize and other crops…

Reducing their storage losses…

Maximizing farmers' income

1 How does a liberalized market function?

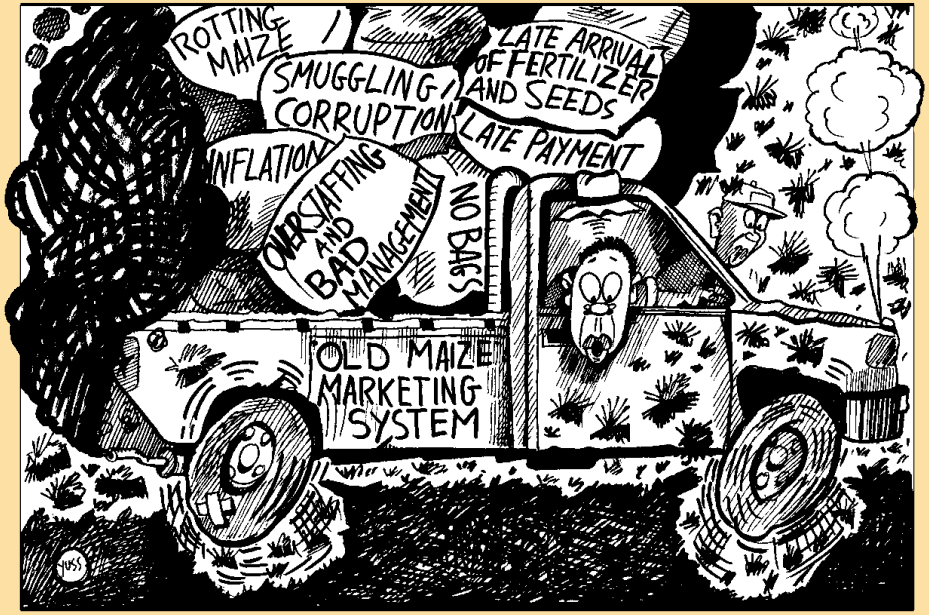
The state-controlled system

- *Advantages and disadvantages*
- *The advantages of the old system were more than offset by the disadvantages*

The private-sector system

- *The main channels through which maize is now marketed*
- *Farmers are faced with a variety of possible channels*
- *There are disadvantages, too*

The old state-controlled system had so many problems that in many countries… …it was breaking down

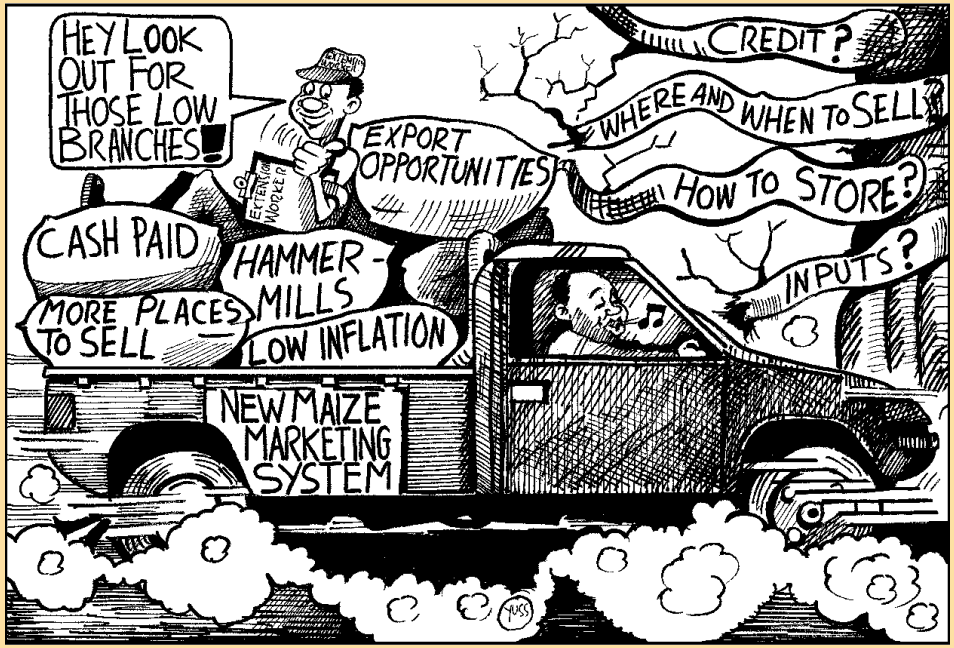


Factors influencing maize marketing

- *Time of the year*
- *Location*
- *Transport and infrastructure*
- *Size of the harvest, both nationally and in neighbouring countries*

The decisions farmers now have to make

- *When and where to sell?*
- *To whom and at what price?*
- *When and how to store?*
- *When and how to buy inputs?*
- *How to pay for them?*



The new system overcomes many of the old problems…
…but it introduces a few new ones
(Helping extension officers to work with farmers to solve them is the purpose of this Guide.)

THE OLD SYSTEM

Under the old system, maize marketing arrangements were quite simple. Fairly soon after harvest the farmers delivered their dried maize to the cooperative or marketing board depot at a pre-announced, fixed price. The marketing board stored the crop and eventually delivered it to the government mill and the mill sold the milled maize to consumers. Normally, farmers retained maize for their own consumption and either milled it by hand or had it milled for a fee at a local hammer mill.

Farmers could easily sell their maize and they usually knew a long time before harvest how much they would get for it. The price was the same throughout the country and this helped farmers in remote areas to obtain a cash income. Farmers only had to worry about storing maize for their families, not for the market. In many countries the supply of credit was linked to the later sale of maize. Because there was only one buyer of maize it was theoretically possible for agricultural development banks to lend farmers money for fertilizer and seeds and arrange to get repaid through the maize marketing board.

Unfortunately, the advantages of the old system were more than offset by the disadvantages.

Some of these were:

- marketing boards and cooperatives were generally badly managed and overstaffed. Corruption was not unknown and maize often disappeared mysteriously from warehouses;
- governments set prices unrelated to supply and demand. This often led to the build up of stocks when high producer prices led to production that far exceeded consumer needs;
- in some cases the opposite happened. Governments set low prices for maize. This led to shortages of maize in the towns, the development of an illegal, “parallel” market and sometimes to smuggling to neighbouring countries;
- marketing boards were obliged to buy from farmers in remote areas. Transport costs were very high, contributing to the high marketing costs of most boards.

The total effect of these problems was that governments basically had to print money in order to keep the system of subsidized prices and high marketing costs going. It was a system that, sooner or later, had to end.

THE PRESENT SYSTEM

Under the existing system there are many different ways in which maize reaches the consumer. These vary depending on the country and location and cannot all be described in detail here.

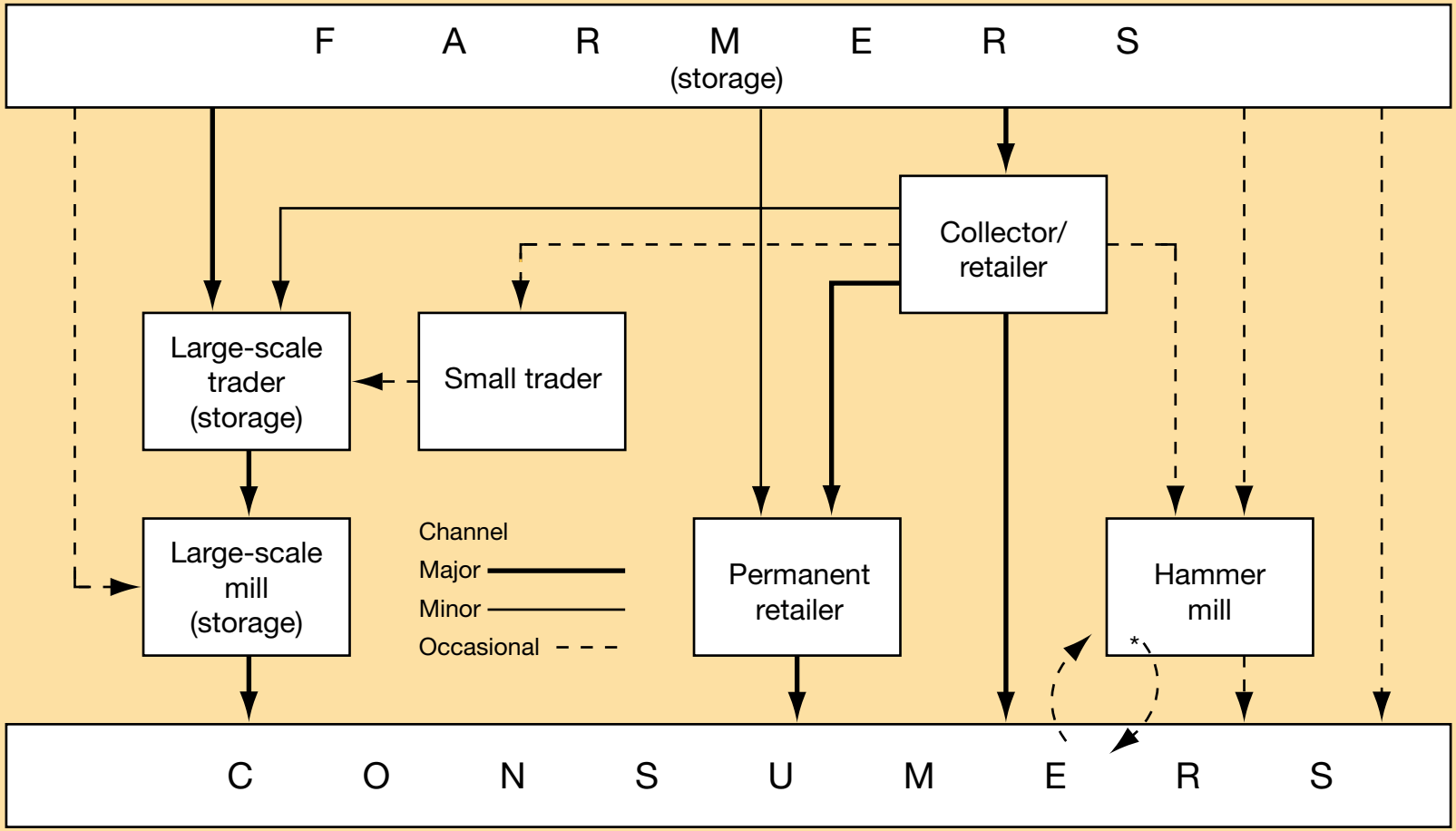
Figure 1 (see page 12) illustrates the *main* maize marketing channels likely to be found in Africa. These are described below:

- farmers take their maize to a local market and sell it directly to consumers, who then mill it by hand or take it to a local hammer mill;
- farmers take their maize to a market and sell it to a trader/retailer who operates at the market on a permanent or semi-permanent basis. The trader/retailer may sell the unmilled maize to consumers or have the maize milled;
- large farmers who live reasonably close to large, commercial mills sell direct to those mills. Groups of farmers could also consider getting together to organize a truckload of maize to take to a large mill;
- collector/retailers visit villages to buy directly from farmers and subsequently sell the maize to consumers at retail markets.
- collector/traders buy maize from farmers and then sell it to larger traders who, in turn, sell it to large mills. Between the collector/trader and the large trader there may be one or more intermediaries who bulk up grain into consignments large enough to interest the large traders;
- large-scale traders buy directly from farmers and deliver maize directly to the mills or to large urban markets. If they think the price is likely to rise in the following months they may consider storing the maize for some time. This is only an option when they have enough money to carry on buying, as most traders need to sell maize to get cash to return to the villages to buy more;
- a retailer accepts payment for fertilizer in the form of unmilled maize which he, in turn, sells in his store or sells to large traders.

These previous descriptions may appear to be complex but, in fact, are a rather simple version of the channels that can be found. Traders may have several alternative places in which they can sell the maize they buy from farmers. Traders buying maize in the Mbeya Region of Tanzania, for example, may sell that maize at the retail market in Mbeya town. But they could decide to transport the maize all the way to Dar es Salaam. They could even decide to sell the maize to buyers from Zambia or Malawi. In fact, marketing policy changes have led to greater trade between countries. There are no certainties in the way maize is marketed and maize marketing patterns can change rapidly in response to changing market conditions and prices.

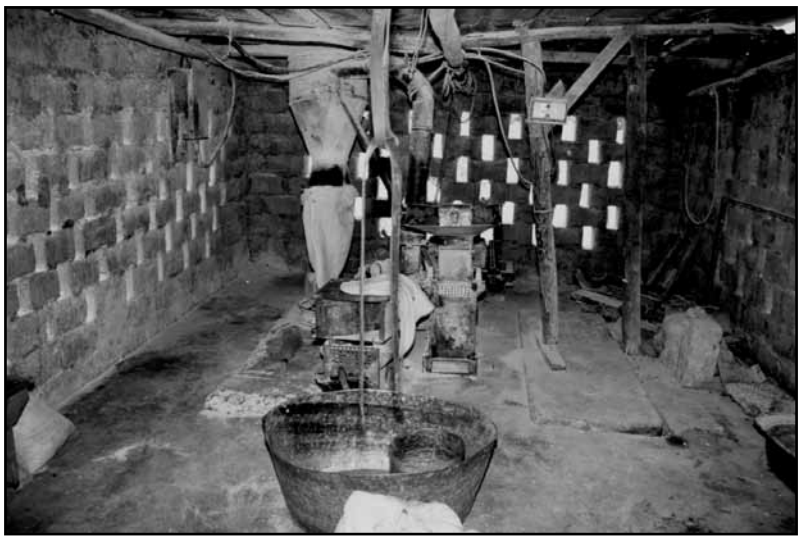
Figure 1

Examples of marketing channels for maize



* interaction between consumer and hammer mill

In recent years there has been an increase in the number of hammer mills in most countries in the region



Examples of basic hammer mills – Zambia

INFLUENCES ON MAIZE MARKETING PATTERNS

There are several factors that influence the way in which maize marketing is carried out. These include:

- time of the year;
- location and transport facilities;
- availability of market places;
- size of the harvest;
- size of the harvest in neighbouring countries.

Time of the year

Immediately after harvest farmers are often forced to sell some, or occasionally all, of their crop in order to raise cash to pay off debts and meet household expenses. Maize is readily available, even if the harvest has not been good. This means that traders do not have to go far to find maize to buy and farmers in remote areas are likely to have problems selling their crop. This has been one of the major negative aspects of policy changes. Farmers in remote areas have been the main losers from policy reform.

Location and transport facilities

The marketing channels for maize produced by farmers living close to big cities or close to major roads or railway depots are likely to be very different to marketing channels for maize produced in remote areas. Farmers in remoter areas will have to play a much more active role in selling their grain and may have to take it to the trader rather than wait for the trader to visit their village. The marketing channel for maize from remote areas is also likely to have more intermediaries involved, so that the maize may be bought and sold several times before it finally reaches the consumer.

Availability of market places

Where there are markets that attract a large number of consumers or traders looking to buy maize, there is more incentive for farmers, either individually or in groups, to try to sell their own produce. As maize was not traded at markets in large quantities until the 1950s, several countries in the region lack suitable local markets that can operate weekly or twice-weekly. One role for extension workers is to identify possibilities for developing or improving such markets.

Size of the harvest

When the harvest is good traders will only want to buy maize when they are sure they can sell it at a profit. Traders in remote areas may feel that their marketing costs to send maize to distant towns are so high in relation to the price that it is not worth buying more than they need to supply local communities. When the harvest is good, all traders will be reluctant to buy maize for storage because the price is unlikely to go up enough to cover storage costs. Under these circumstances farmers have to bear the burden of storage.

On the other hand, when the harvest is poor traders with spare cash will look to buy maize and store it, in expectation of a large price rise later in the year.

Size of the harvest in neighbouring countries

As mentioned, countries can no longer regard themselves as islands as far as maize supply and demand are concerned. As trade between neighbouring countries is increasing, a poor harvest in one need not necessarily lead to big price rises. It all depends on what happens in the others. Clearly, countries in the same area do tend to experience similar weather patterns and when there is a major drought it usually affects several in a sub-region. But in Eastern and Southern Africa rainfall in South Africa can be good when it is poor in Malawi, Zambia and Zimbabwe and weather patterns in Tanzania and Kenya often differ from those in the centre of the region. Thus traders will increasingly come to make decisions about how much to buy, when and at what price and about whether or not to store, on the basis of the harvest in neighbouring countries as well as the one in which they are operating

DECISIONS FACING FARMERS

Farmers are now faced with a bewildering range of options over selling their maize and extension workers need to be able to help them make the right decisions. If farmers have to sell immediately after harvest in order to raise cash…

- ***Should they go to the market and sell there, or should they wait for the traders to come to their village?***
- ***How do they know what the price in the nearest town is?***
- ***How do they know if the trader visiting the village is offering a reasonable price?***
- ***If they do not have to sell immediately after harvest, should they sell anyway or should they wait for a few months and, if so, when exactly should they sell?***
- ***What sort of storage is needed to make sure the maize stays in good condition?***

Selling the crop is not the only change that farmers have had to adjust to. The pattern of farm input marketing has changed, as have arrangements for credit.

Under the new system, private-sector fertilizer retailers have taken over from government agencies. Private traders may be able to give credit to a few farmers but this will be the exception as such traders will not have the financial resources to provide large quantities of credit. They will only give credit to farmers they know and can trust to repay. Farmers will also find it more difficult to get input loans from agricultural development banks, as these banks can no longer rely on the marketing boards to collect repayment. Thus many farmers will have to pay for their inputs in cash. Extension workers have a job to do in pointing out to farmers the need to save money to buy inputs for the following season. They can also work with farmers to develop group credit applications, as credit requests from groups are more likely to find favour with the banks.

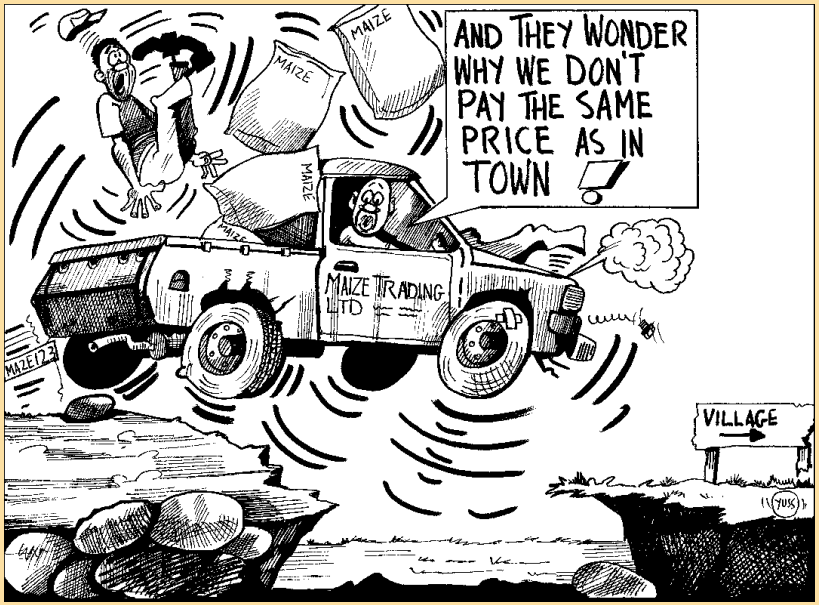
2 The price paid for farmers' produce

Main points in Chapter 2

The price paid for farmers' produce

What influences prices?

- *Supply, which is influenced by…*
  - *How much maize farmers produce*
  - *How quickly they need cash*
  - *How much storage they have*
  - *The price they are offered for their maize*
- *Consumer demand, which is influenced by…*
  - *The price. A high price will make consumers reduce purchases and be more careful with what they do buy. A low price will encourage increased consumption, although consumers can only eat so much maize meal*
- *Trader demand, which is infuenced by…*
  - *Production levels in other parts of the country. Traders will prefer to buy in easily accessible areas. Demand for maize in other areas will thus be low until there is no more left in easy-to-reach areas*
  - *Production levels in neighbouring countries*



Traders prefer to go where roads are good…
…and will pay higher prices

Traders will be happier to make a visit if they can collect sizeable quantities and don't have to visit farmers individually.

- *Location*
  - *Distance from the market*
  - *Condition of the roads*
  - *Quantity of maize available*
  - *Extent of competition between traders*
- *Time of the Year*
  - *Seasonal price pattern is influenced by…*
    - *farmers' cash needs after harvest*
    - *production in urban gardens*
    - *suitability of on-farm storage*
    - *size of total harvest*
    - *storage by traders*
    - *forecasts of following year's production*
- *Information*
  - *The extent of information available is an important influence on prices*
- *Quality*
  - *Better quality maize at the right moisture content will get better prices*

INTRODUCTION

Under a private-sector marketing system, the prices which traders are prepared to pay vary throughout the country. This reflects the different costs that traders have to meet in getting the maize from the farmer to the market. The price will almost certainly rise over the season. Prices can be expected to be lowest immediately after harvest and then go up as supplies become scarcer. There is no such thing as a maize "price." There are many prices and these may even vary within the same area, with some traders offering more than others at any particular time.

In the days of marketing boards governments usually tried to fix the maize price so that it was greater than the cost of production. This was in order to give farmers a reasonable return for their labour. Under the new system, however, when there is a large surplus farmers may sometimes have to sell their maize for less than the cost of production. This is a problem faced by farmers throughout the world when prices are decided by market conditions.

INFLUENCES ON PRICES

There are a number of factors that influence the prices of products. These include:

- supply and demand;
- location;
- time of the year;
- information;
- quality.

Supply and demand

Prices of most products generally respond to both the *quantity supplied* and the *quantity demanded* of that product. In theory, when prices go up there will be a fall in demand and an increase in supply. In time, the amount supplied at a particular price will come to equal the amount demanded.

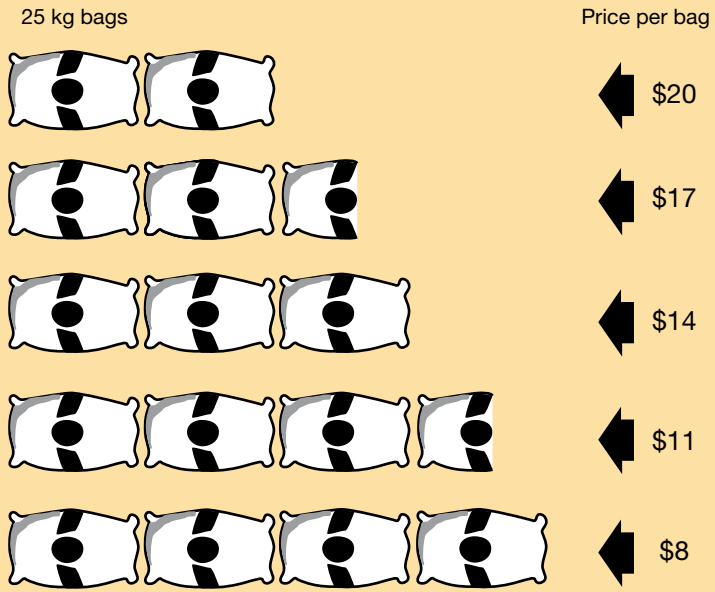
In the case of staple foods such as maize the situation is not so straightforward. Farmers do not, in the short term, have much control over how much of a product is produced. They can, for the following season, reduce the amount of maize they produce by using less fertilizer, not planting such a large area, growing other crops, or do just the opposite to increase maize output. For any particular harvest, however, the prices they receive are very much influenced by the total amount produced in

the country and region which, in turn, is mainly influenced by the weather.

Quantities of maize supplied by farmers to the market at a particular time will depend on several factors, including:

- *how much maize they have produced*. When the harvest is good they will clearly have more bags for sale;
- *how much cash they need*. Farmers often have to sell some of their maize immediately after harvest to pay back loans and raise much-needed cash. How many bags each farmer sells will depend on the price and on how much cash they need;
- *how much storage they have*. Farmers may be unhappy with the price offered and want to store their maize until later in the year, in the hope that the price may go up. However, they may not have suitable storage available to them, or storage may be more expensive than the benefits of storing (see Chapter 5);
- *the price*. If the price is high farmers may try to sell all of their produce as quickly as possible, so increasing the amount supplied to the market in the short run. If the price is really high, some may even make the mistake of selling maize that they should be keeping for their family's consumption later in the year;

Figure 2
Possible monthly maize meal consumption by a family at different prices



Demand for maize will, likewise, depend on a range of factors:

- *if the market price is high*, consumers will reduce their purchases of maize meal. This may simply mean eating less. But it can also mean that consumers will be more careful about how much they cook, and eat more or less the same quantity but waste less. It can also mean eating less maize meal and eating more of other products, such as bananas, roots or tubers. Consumers may also respond to higher prices by eating lower qualities of meal. As it takes more unmilled maize to produce a bag of super-sifted meal than it does to produce a bag of unsifted meal, this will also reduce the quantity of maize demanded;
- *if the market price is low*, consumers will increase their consumption of maize meal (see Figure 2). But a person can only eat so much meal, so consumers who can already afford adequate quantities will not increase their consumption by much. The demand for staple foods, such as maize, is said by economists to be relatively price inelastic. That is, demand does not change very much in response to price changes;
- *demand by traders* for maize produced by farmers in one area will depend on how much farmers in other areas have to sell. For example, if the harvest in the south of Malawi is excellent, traders will be able to buy most of the maize they need to supply Lilongwe and Blantyre in the south, and will be less likely to visit the north of the country to buy maize;
- similarly, *demand will depend on production levels*, and hence prices, in other countries of the region. If production in one country is poor then farmers might reasonably expect prices to rise as traders compete for the limited crop available. However, if a neighbouring country has had a bumper crop larger traders may be able to get much of their requirements from that country. The price they will be prepared to pay locally will then be related to the cost of the maize in the other country and the differences in transport costs.

It is important to stress that *demand* is a commercial concept and is not the same as *need or requirements*. For example, consumers in a country may each *need to* consume the equivalent of 150 kg of maize a year in order to obtain the required level of nutrition. But many may not be able to afford 150 kg. Effective *demand* for maize represents what people can afford to buy, together with anything the government may buy in order to feed poorer people. *Demand* may therefore be significantly less than 150 kg per capita.

Location

While the supply of and demand for maize will influence the general level of prices and the price trends, the actual price at which farmers can sell their maize will depend on other factors as well. Location is one of them.

Some reasons for this are discussed below:

- *distance from the market*. It will cost a lot less to transport a bag of maize from a farm which is 20 km from a mill than from one which is 200 km from a mill. Therefore, farmers who live close to major markets, that is towns and cities, will almost always receive higher farm-gate prices.
- *condition of roads*. Those maize farmers who live close to a main road, which is in a good state of repair, will earn more for their maize than farmers living the same distance from a city but at the end of a minor road in very bad condition. Transport costs will be much lower and traders will prefer to visit villages close to a main road, and will be able to pay more.
- *quantity of maize available*. Transport costs per bag of maize usually go down as the size of the truck used increases. Locations where farmers have sizeable quantities can attract larger trucks. With lower transport costs, traders can pay more. Moreover, an important cost for traders can be the time it takes them to buy maize. The quicker they can buy a truckload, the quicker they can sell the maize and return to the rural areas to buy more maize. The more often traders can buy and sell, the greater their profit, so they will pay higher prices in areas where it is easier to buy maize in suitable quantities, for example at local collection points or local markets.
- *the amount of competition between traders*. Where there is a lot of maize available there are likely to be several traders trying to buy it. For the reasons indicated above, they will want to maximize their purchases as quickly as possible and may increase their prices in order to persuade farmers to sell to them. However, in a situation where there is not much grain available, there will be little incentive for traders to go to a village. If only one or two traders visit a village then there will be little competition and the prices paid will be much lower.

Time of the year

While the *level* of prices will vary every year according to the general level of price inflation and the size of the harvest, they will almost always follow the same seasonal pattern. For a country that begins its harvest in April or May, it can be expected that consumer prices will be rising in the December to March period. In April they may stay more or less the same until the end of the month and then prices will begin to fall as a lot of new maize becomes available. Prices will continue to fall until June and will start to rise slightly in July, rising more steeply towards the end of the year.

The consumer price mirrors the price paid to the farmer. In the case of retail sales of meal, the farmer prices rise and fall a couple of weeks before the consumer price does as it takes some time for changes in the price of the raw material (maize) to filter through

into changes to the maize meal price. However, this may not always be the case. A sudden shortage in the city could lead to a meal price rise which would only later result in higher maize prices to farmers. Over a season the following factor are likely to affect prices:

1 immediately after harvest farmers need to sell some produce to raise cash. They will try to sell at least as much maize as they need to sell in order to raise enough cash to meet their needs;
2 although prices go down, demand is, as we have seen, relatively inelastic. Thus there will not be a major increase in consumption and prices are unlikely to be forced upwards unless there is strong demand in neighbouring countries;
3 many urban consumers have small gardens of their own and will be able to grow enough to meet their maize needs for at least a few months. Others will receive maize from relatives living in nearby villages;
4 a few months after harvest farmers realize that the storage they have is not good enough for storing maize during the rainy season and they sell much of the remainder of their crop. They also worry that no traders will visit their village during the rainy season;
5 some months after harvest, traders, who will be continuing to try to buy as much as possible, will find it increasingly difficult to obtain maize and will raise their prices as a result. Clearly, the extent to which prices go up will depend on the size of the harvest. Price rises may be very small when there is a large surplus crop;
6 if traders feel that the price of maize is likely to go up a lot they may try to buy maize cheaply at the beginning of the season and store it until the price goes up enough for them to sell at a profit. This is not a widespread practice on domestic markets at present because most smaller traders lack the money to store large quantities. However, larger trading companies also operate in Africa and these may buy produce early in the season for subsequent export;
7 if farmers feel that the price of maize will go up they may decide to store it and wait for higher prices. In countries that have only recently changed their marketing system this is also not a widespread practice, partly because farmers do not have suitable stores but also because they still have an insufficient understanding of the way the market operates;
8 the extent to which prices increase towards the end of the season will depend on the price of maize in neighbouring countries. If imports are possible, the price will only go as high as the price in the next country, plus transport costs;
9 finally, expectations of a good harvest will permit farmers to sell the stocks they have kept for family use, if they can produce enough to replace these. This may lead to a stabilization of or reduction in prices even before the new harvest becomes available.

Information

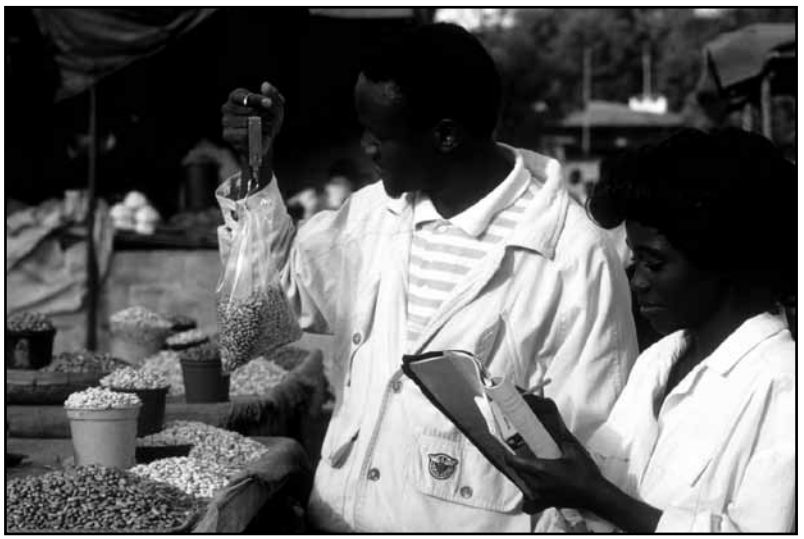
The extent to which various kinds of market information are available has an important influence on prices.

Examples of information and how it can be used are:

- if farmers know what prices traders are paying in their area they are better able to negotiate with the traders to obtain good prices;
- if farmers and traders know that the harvest has been bad in many parts of the country they can then make a decision to store maize for some months, in expectation of price rises later in the season;
- if farmers and traders know what the prices are in neighbouring countries they can then make informed guesses about how high the prices in their country are likely to go.

Quality

In the days of marketing boards there usually existed standards relating to moisture content, damaged kernels and foreign-matter content. One of the factors contributing to the problems of the boards was that these standards were sometimes inadequately applied, if at all. Under the private marketing system there have not been many formal standards for domestic trade, although standards have to be used for international trade. Increasingly, however, significant quantities of grains are beeing traded on commodity exchanges, for which the use of agreed standards is essential.



Collecting price information

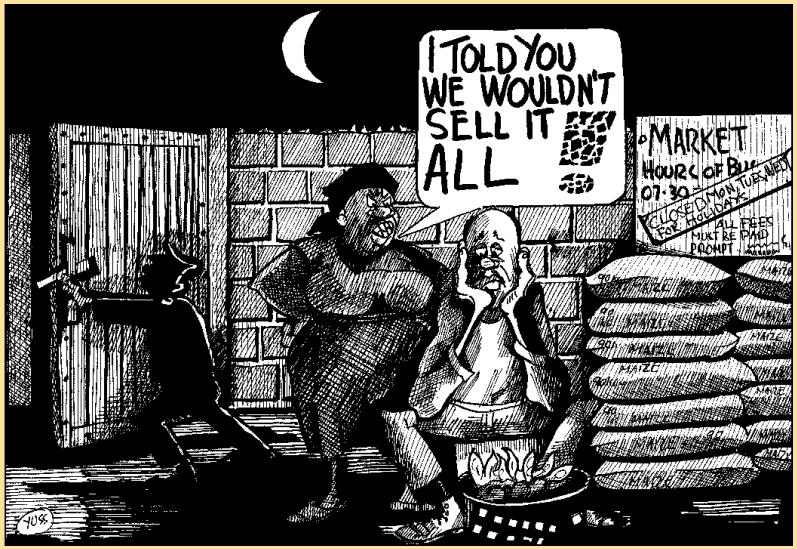
3 Helping farmers with their marketing

Main points in Chapter 3
Helping farmers with their marketing

Problems farmers face when to selling to traders

Farmer options for selling maize

- *To consumers at markets*
- *Wholesale at markets*



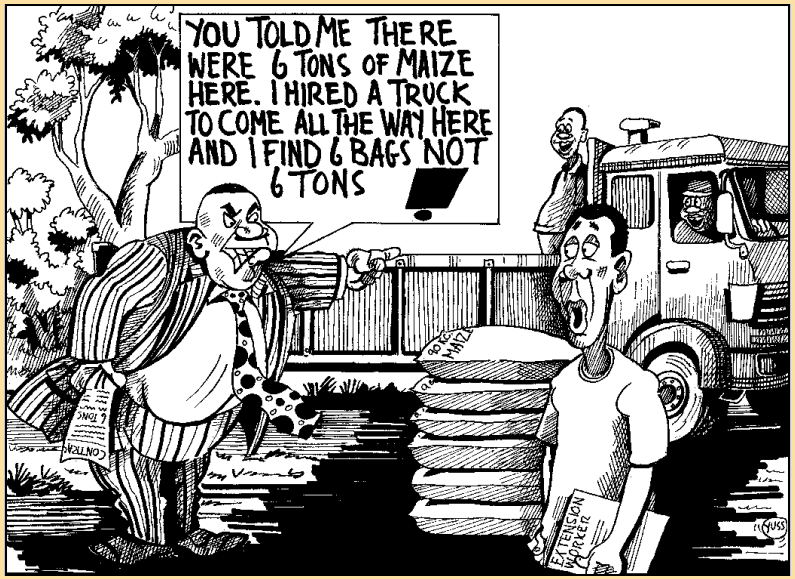
When selling directly to consumers farmers may have to stay at the market for several days in order to sell all their maize.

Extension workers can advise farmers on traders to use and what prices to expect. However, extension workers need to be sure of their facts… and be sure that the traders they recommend are honest.

- *To traders in towns*
- *To traders who visit the farms*
- *To hammer mills*
- *To large-scale mills*
- *To their cooperatives or associations*

Help farmers to find buyers

- *Identify buyers and their prices*
- *Arrange for traders to visit villages*
- *Ensure sufficient maize is available*
- *Arrange for group transport*



The visiting trader sometimes finds that promised quantities are not available… extension workers must be sure that both traders and farmers will honour the agreements they make.

Obtain and use market information

- *Price categories*
- *Buying price information*
  - *minimum quantity*
  - *with or without bags*
  - *conditions of payment*
  - *quality requirements*
- *A checklist of questions for traders*

Help farmers decide when and how much to sell

- *What are their consumption requirements?*
- *What are their cash needs?*
- *How will they finance inputs?*
- *Should they store maize?*

Identify ways to improve marketing

- *Provide better marketing information*
- *Improve understanding of the system*
- *Develop assembly markets*
- *Maintain and improve rural roads*

THE PROBLEMS

Farmers may face a number of problems in marketing their maize. They may ask the following questions…

- ***If there are several traders, which one should they sell to?***
- ***What is a realistic price to ask for?***
- ***If no traders come to their village, how can they find a buyer?***
- ***Can they join together with other farmers in the village to sell their maize?***
- ***Should they consider going to the retail market and selling their maize directly to consumers?***
- ***How much should they sell now and how much should they store until later?***

These are immediate problems that farmers may face, and extension workers should be in a position to advise them. In the following chapters we also discuss some of the longer term decisions that farmers will need to take, such as whether or not to build new maize stores or whether or not to start growing new, higher-value crops.

MARKETING OUTLETS

In Chapter 1 the different marketing chains that are likely to be found were described. Farmers may have several options. They could:

- take their maize to market and sell directly to consumers;
- take their maize to market and sell to traders in the market;
- sell their maize to traders in nearby towns;
- sell their maize to traders who visit their village;
- sell their maize to a hammer mill;
- sell their maize to a large-scale commercial mill;

Selling directly to consumers

This is only a realistic option for farmers who live close to a town with a market or for farmers who only have a small quantity to sell, which can be disposed of locally. Selling in retail markets is time-consuming and the farmers may have to stay at the market for several days in order to sell their crop. They will have problems in storing their maize in the market and making sure it is not stolen. Also, the time they will have to stay in the market can be considered a cost. Although they may be selling maize at a time of year when there is not so much work to be done on the farm, there may be other work to do where they could earn a wage or, simply,

other things they would prefer to do than sitting in a market all day. Also, some markets may only allow licensed traders to sell and not allow farmers to sell their own produce. Realistically, therefore, selling directly to consumers is an option for only a few farmers.

Selling wholesale in the market

An alternative to selling directly to consumers is to take the maize to the market and sell it to a retailer who is licensed to trade there. Alternatively, many markets function both as retail markets and as assembly markets where traders buy from farmers for subsequent resale, not to consumers but to large mills or other traders. Selling to traders has advantages for farmers in that they will not have to sit in the market for a long period. But if they sell to traders they will be selling at the wholesale price, which will obviously be less than the retail price.

A problem with taking maize to the market is that farmers have to arrange transport. This may not be so easy to organize, particularly when they only have a few bags. It may also be more expensive for a farmer, per bag, than it would be for a trader visiting the farmer's village. Once at the market, the farmers are faced with another problem – if they cannot sell their maize they have to take it back home again. Traders will realize this and, as a result, may lower the price they offer. Thus, while taking maize to the market should always get farmers a higher price than if they waited for the trader to visit, it may not always be sufficiently higher to compensate for the extra costs involved.

Selling to traders in towns

Larger traders are likely to have their own warehouses in towns. They offer an important outlet for farmers who want to deliver their own maize to buyers rather than wait for the buyers to visit them. They may also be more likely to buy at a fixed price than to negotiate with the sellers. It would greatly help farmers to know in advance the prices such traders are paying and this is an important way in which extension workers can help farmers (see also Obtaining and Using Market Information on page 36).

Selling maize to visiting traders

This is the easiest option for farmers. They do not have to worry about organizing transport and they may even not have to worry about buying bags, as the trader may provide them. The trader buys on the farm or in the village, so minimizing the farmer's workload and the time spent in selling maize. However, dealing with traders in this way is not without its problems. First, they may not always visit the village when the farmers want to sell. If farmers have to ask traders to visit their village then the price they are prepared to offer will be less than if they planned to visit the village anyway. Second, traders may have insufficient funds to pay cash. Farmers may have to be prepared to wait for a month or two to get their payment and, in some cases,

may never get paid. Third, the price visiting traders pay will be less than if farmers delivered their maize to buyers in urban areas. However, as already stated, the net return to farmers from selling in the village may well be greater than from going to town, as traders may have lower transport costs than farmers.

Selling to a hammer mill

One aspect of market liberalization has been the rapid expansion in the number of maize hammer mills in the region. Entrepreneurs have installed these both in cities and in fairly remote villages. Such mills often offer cost advantages over large-scale mills and consumers have frequently found it worth their while to buy maize and take it to the nearest hammer mill for milling, rather than to buy commercially produced meal.

Hammer mills have mainly concentrated on milling for farmers or consumers for a fee per bag or kilogram. Relatively few have gone into business as buyers of

While many farmers now use hammer mills to mill maize for their own use for a fee, hammer mills may in time begin to buy maize to mill and sell to consumers

maize and sellers of maize meal. However, this situation may well change, as the increase in the number of hammer mills means they may find it more and more difficult to make a profit and, consequently, will be looking for ways of increasing their business. Obviously, mills based in villages where all farmers grow maize won't find much demand for maize meal, but mills closer to urban areas could well represent potential buyers of maize.

Selling maize to large-scale mills

Commercial mills represent a large potential market for farmers, but they are likely to want to buy maize by the truckload and not in quantities of a few bags. Smaller farmers can only consider delivering directly to such mills if they can organize themselves into groups to hire a vehicle. This should lead to higher returns for the farmers than if they sold to traders visiting their villages, but these higher returns may not compensate for the problems involved in organizing transport. Unless there is a considerable amount of trust among the group of farmers, each farmer will want to accompany his maize to the mill. In delivering directly to a mill, farmers will also need to be sure that the quality of their maize matches up to that required by the mill – when they sell to visiting traders it is the trader who takes that risk.

Selling maize to cooperatives and associations

Although farmers can work informally in groups to deliver to mills or to supply traders, there has also recently been renewed interest in marketing co–operatives and farmer marketing associations. The best of these can receive their farmers' maize, clean and dry it, and then sell it to buyers further along the marketing chain than the local trader. By doing this, efficient farmer organizations can obtain higher average prices for their farmers by achieving economies of scale, supplying higher quality and selling further along the marketing chain. For example, the World Food Programme (WFP) is working with several farmer groups in Africa to enable them to meet WFP's demanding quality standards for local procurement. Good farmer organizations can also supply inputs such as fertilizer and seed to their members.

Extension workers need to know about such farmer marketing organizations in their area so that they can discuss with farmers the options for them. Working in groups is not for everyone. Some farmers may feel uncomfortable with having to attend the many meetings that cooperative membership often involves. Others may just be too individualistic. But for the bulk of farmers, a well-run cooperative or association can be very beneficial. Extension workers should also familiarize themselves with sources of assistance should their farmers wish to organize themselves. For example, they should know the contact details of the regional cooperative union and farmers' association, as well as the national apex bodies.

HELPING FARMERS TO FIND BUYERS

As already indicated, selling maize or other crops will not always be a simple matter for farmers. Extension workers can do much to help them find buyers for their crops. Working either individually or, preferably, as a provincial or district-wide extension initiative, extension workers can:

- compile a list of larger buyers in the area, together with their terms and conditions and latest available buying price;
- identify villages with surpluses for sale and arrange for traders to visit those villages or nearby collection points;
- help farmers to organize group transport to town markets.

Identifying buyers

Provincial extension offices should, with the help of their district offices, consider compiling and regularly updating a list of buyers of maize and other crops. Copies of such lists should be sent to all extension offices in the province and to village authorities, NGOs, etc. Recipients should be encouraged to display the lists on notice boards or on the doors of buildings, so that they are easily seen by farmers.

Information provided should include:

- name, address and phone number of each maize trader or mill;
- whether the trader will send a vehicle to a village to buy or expects deliveries in town;
- whether the trader buys in bulk or expects the farmer to provide bags;
- payment conditions, that is, on delivery or later;
- minimum quantity purchased, if applicable;
- price offered at buyer's premises at time list was prepared;
- quality requirements.

The traders identified on the list should be subject to immediate removal if they are found to be dishonest in their dealings with farmers. However, complaints should be investigated. For example, farmers may complain that they did not receive the price the trader was advertising. On investigation, it may turn out that the farmers' maize was too moist and the trader had to dry it, thus justifying paying a lower price.

Such a list should also provide information about companies offering vehicles for hire and transport rates per kilometre, both to enable farmers to hire vehicles and to let them calculate the likely buying price of the trader in the village, after deducting transport costs from the published buying price.

Arranging for traders to visit villages

Local extension workers can identify quantities of maize that farmers want to sell, contact traders to find out their buying price and, if the price is acceptable to the farmers, arrange for the buyer to visit the village. One problem that traders in the region have reported is the fact that when they visit villages in response to requests from farmers they sometimes find that the promised quantities of maize were never available, or that the farmers have changed their mind or that they have sold to someone else. In such circumstances, the trader will be reluctant to visit the same village again. Extension workers therefore have to be sure that both traders and farmers will honour an arrangement. They will need to contact other colleagues to find out whether or not the trader has a reputation for reliability, and they will need to stress to farmers the importance of honouring a commitment and the reasons why it would, in the long run, be in their interests to do so.

The price traders will be willing to pay will be higher if they can buy a village's maize at one place, rather than have to visit all farms individually. The latter is time consuming and may, indeed, be impossible for a motorized vehicle. Farmers need to be aware that, for traders, time is very important. Any action on the part of farmers to reduce the time the trader has to spend in the village should lead to a higher price.

Arranging for group transport

Where the extension worker is aware that there are buyers for maize in a nearby town, an alternative to inviting a buyer to visit the village is to organize farmers into a group to hire a vehicle. As noted, information about transport companies prepared to hire out vehicles should be provided at provincial level. The extension workers should contact companies with vehicles for hire and identify those offering the best price for the size of vehicle required.

If a buyer is unable or unwilling to visit the farm … groups of farmers may decide to hire a truck and transport their produce to the buyer

Again, hiring a vehicle, once agreed to, requires a commitment by all farmers in the group. The company renting out the vehicle will not be happy if the vehicle arrives in the village only to find that the farmers have changed their mind. Members of the farmers' group will not be happy if some of their members change their mind, with the result that the group cannot fill the truck and costs per bag go up. They will also be unhappy if some of their members cannot pay for their share of the transport costs, although this problem can perhaps be avoided if it is agreed to pay the hire fee at the time the maize is sold.

Extension workers must be prepared to advise farmers on where to find suitable transport vehicles

OBTAINING AND USING MARKET INFORMATION

Several countries in the region have established market information services to assist both farmers and traders to adjust to liberalized marketing in the short term and to assist farmers to better plan their production in the long term. Where national market information services (MIS) exist, extension workers need to know how to interpret the information, in order to assist farmers to bargain with traders for the best possible price. They also need to know how to add more localized information to the information provided by the national MIS. Where there is no national MIS, the task facing extension workers is much more difficult. They will need to rely on contacting potential buyers directly to obtain price information and on their colleagues in provincial headquarters.

National MIS in the region vary but can normally be expected to provide information on prices in the major cities as well as in some of the important producing areas. They should also increasingly be providing information on prices in neighbouring countries. Although grain prices do not change as rapidly as prices of horticultural crops, MIS which cover grains should try to update price information at least weekly.

It is important that the extension worker is able to explain the reasons why prices that the farmer may hear broadcast

on the radio are not the same as the prices the trader is offering in the village. In the first place it is important to know the different types of prices which may be quoted by an MIS. These could include the following:

Into-Mill price. This is the price that large commercial mills are paying. Normally, the price will be for cash purchases, but sometimes the mill may want to delay payment for, say, 30 days. This can be important, particularly in countries with high inflation and/or high interest rates. If traders get paid after one month by the mill but pay the farmer in cash, then they will have to lower the price to the farmer to cover the cost of financing the maize for that period. Ideally, an MIS should indicate payment terms when quoting prices. The Into-Mill price may also have other conditions attached to it. For example, a minimum number of bags may be required and quality specifications will have to be met.

Wholesale price. A clear distinction needs to be made between the wholesale buying price and the wholesale selling price. In some circumstances, the Into-Mill price may be the same as the wholesale selling price. The wholesale buying price should be quoted in reference to a location, that is the price paid by traders in a particular town or city. Wholesalers usually want to deal in a minimum of one bag and MIS may well quote prices with reference to a bag rather than to kilograms. Care needs to be taken not to confuse the price for the old-style 90-kg bags with that for the newer, and increasingly used, 50-kg bags.

Retail price. It is an uneconomic use of wholesalers' time to sell maize in small quantities. Thus they will usually sell by the bag to retailers who will then sell small quantities to consumers. To do this profitably, the retailers will have to sell at a higher price per kilogram than they paid when they bought the maize. Thus the retail price cannot be used as a significant indication of the price the farmer can expect, although trends in retail prices should indicate likely trends in prices to the farmer.

To convert one of the above types of price into an estimate of a price farmers could realistically expect to get at their farms requires a knowledge of marketing costs and of the margins that traders will want to obtain. In Chapter 4 marketing costs will be discussed in some detail.

Where information is collected about traders in a province or region, buying price information should also be obtained. This information should include:

- the minimum quantity the price paid refers to;
- whether the price is for loose or bagged maize;
- whether payment is immediate or after a certain time;
- whether payment is by cheque or cash;
- quality requirements, for example moisture content.

Extension workers should always check information provided by the provincial extension service before arranging for buyers to visit villages or for farmers to go to town to sell maize.

The situation regarding trading operations can change quickly. Before contacting potential buyers, therefore, it is useful to prepare a checklist of questions to ask:

Box 2
Checklist of questions for traders

1. How long have they been in business buying maize?
2. How much did they buy and sell last year?
3. Which areas did they buy from?
4. Location and opening hours of depot.
5. Are the traders willing to visit farms to buy and, if so, when can they visit?
6. Minimum quantity required if traders are to visit farms to buy.
7. Will the traders buy from farmers individually or do they want all maize assembled in one place?
8. Price paid per bag at the depot.
9. Price paid at the farm-assembly area.
10. Do the traders pay immediately or, if not, when will they pay and, then, how will they send payment to the farmers?
11. If the traders pay immediately, is it by cash or cheque?
12. Do the traders buy maize already bagged or will they buy bulk maize?
13. What is the maximum moisture content the traders will buy at?

(see endnote 1)

Conditions of payment are always important ...

Sometimes farmers have to wait for payment and in some cases may never be paid at all

New ways of accessing information

With the growth of the internet and the widespread use of cell phones, it is now easier for farmers to obtain information than in the past. These technology developments are also leading to new ways of linking farmers up with potential buyers. For example, the Zambia National Farmers' Union has a web site on which traders can post information about crops they want to purchase. Farmers can then contact the traders by SMS text messaging.

WHEN AND HOW MUCH FARMERS SHOULD SELL

Farmers need to decide whether to sell part of their crop immediately after harvest or whether to wait some time in the hope that the price will go up. Factors determining when and how much farmers should sell include:

- how much their family will consume between one harvest and the next with, in drought-prone areas, some possible carry-over into the following season;
- their immediate cash needs, including repayment of loans;
- the need to finance inputs for the following season;
- the price and storage opportunities. When the harvest is poor, prices are likely to rise more rapidly than when the harvest is good, thus justifying storage. But farmers need to have a clear idea of their storage costs;
- difficulties they face in selling their maize.

Consumption requirements

Unless farmers have other income opportunities in addition to the output of their farms, and unless they are sure that there will be maize available to buy when they need it, they should be advised to store enough maize for their family's requirements until the next harvest. They should not be tempted by high prices to sell all their production because when they want to buy maize for their families the price will be much higher. Where the farm is in an area with a medium to high risk of drought, they should consider keeping back more than one year's consumption. Farmers often grow two different varieties of maize; a traditional variety for their own consumption and a high-yielding hybrid for the market. Traditional on-farm storage facilities are rarely suitable for long-term storage of hybrid varieties (see Chapter 5).

Cash needs

Previous sections of this Guide discussed the immediate needs that farmers might have for cash. Clearly, they will need to satisfy those needs and will sell maize to do so. However, this puts them in a very weak bargaining position with traders, as they will not be able to hold out for higher prices. Extension workers should advise farmers to try to save some money from their maize sales in order that they are not placed in such a weak position after the following harvest.

Financing inputs

In a similar way, farmers should be encouraged, where possible, to either save money in order to buy seeds and fertilizer for the next growing season or to keep back some maize to sell when inputs are required. Chapter 7 looks in more detail at input supply and credit arrangements. In many countries of the region, the agricultural credit banks are experiencing difficulties. It

is, therefore, all the more important that farmers try to finance their own input requirements.

Prices and storage

Chapter 5 looks in detail at storage of maize and at how farmers can calculate whether or not to build new stores. However, even if farmers have suitable stores to keep maize they have, in any year, still to decide whether to store maize or whether to sell it. It may not always be in farmers' interests to store in some years, as the price may not rise sufficiently to cover the costs, and risks, of storage.

Where a market information service has been functioning for several years it should be able to make available data about seasonal price trends. From this, extension workers can get an idea of the seasonal pattern of prices. However, the exact pattern in any year depends on the size of the harvest. As noted, when there is a good harvest prices may not rise by very much over the year, and storage may not be very profitable. When the harvest is poor, prices may go up a lot and farmers who store may do very well. However, this will depend on the price in neighbouring countries, and extension officers also need this information in order to advise farmers on the best approach. Chapter 5 also gives an example of how to calculate the likely returns from storage.

Marketing difficulties

While farmers can, theoretically, decide to keep maize for sale later at a higher price this may not always be a practical option. When they want to sell their maize there may be no traders around who want to buy it. This situation is most likely to arise in a remote area which is difficult for traders to reach in the rainy season. When farmers have doubts about marketing possibilities later in the year it may be a wise option to sell before the rains begin.

IDENTIFYING WAYS OF IMPROVING MARKETING

In addition to providing direct advice and assistance to farmers to help them market their crops, extension workers need to be looking at ways of improving the way agricultural marketing is carried out. They should be prepared to contact their provincial and national offices with suggestions for:

- improving the market information that is provided;
- preparing leaflets and posters for farmers to help them understand how the marketing system works;
- developing sites that could serve as assembly markets where farmers and traders meet;
- maintaining and improving rural roads.

4 Maize marketing costs

Types of marketing cost

- *Packaging*
- *Transport*
- *Handling*
- *Weight Losses*
    - *spillage*
    - *theft*
    - *moisture loss*
    - *cleaning*
    - *damage in storage*
- *Storage*
    - *warehouse charges*
    - *value depreciation of store*
    - *cost of maintaining quality*
    - *quality losses*
- *Capital*
- *Other costs*
    - *weighing*
    - *market fees*
    - *local taxes*
    - *"unofficial" taxes*
    - *traders' overheads*

A calculation to help farmers allow for price inflation

Examples of marketing cost calculations

- *Small trader selling maize in a local market*
- *Large trader selling maize to a large mill*

Bagged maize from farmers often contains straw,
stones and other foreign matter
and must then be cleaned by the trader
before it can be sold.

Sometimes farmers even try to defraud traders
by putting in large stones or other objects…
in the end it is the farmers who suffer
as traders will pay them less in the future.

TYPES OF MARKETING COST [2]

This chapter concentrates on the costs of marketing maize [3]. The costs described are similar to the costs associated with the marketing of other crops and the cost-calculation methodology outlined can also be used for other crops.

In moving produce from farmers to the eventual buyer, traders have a large number of costs, some of which may not be immediately obvious to farmers. It is important that farmers understand these costs. Otherwise they are likely to look at the large difference between the price the traders offer them and the price that mills pay the traders and conclude that the traders are exploiting them. This is particularly the case in countries where governments continue to buy some maize and do so at prices that do not reflect full marketing costs. Extension workers need to understand marketing costs in order to be able to explain to farmers the reasons for these differences. Various marketing costs are:

- packaging;
- transport;
- handling;
- weight losses;
- storage;
- capital/other costs.

The first cost faced is for *packaging*. If farmers provide the bags then they will be justified in expecting a higher price. The most important cost is usually for *transport* and this will be understood by farmers, although they may not always understand that transport costs can be more than for a simple journey from one place to another. A less obvious set of costs are those incurred in *handling* the bags of maize. Bags may be loaded and unloaded several times, all of which needs to be paid for. Between the farmer and the mill there is likely to be some *loss of weight* compared with the quantity purchased. The grain may be too damp at the time of purchase and may lose weight through drying out or drying carried out by the trader to avoid quality loss. Maize may be lost through holes in the bags or through theft. If the trader keeps the maize in store for several months then it may be attacked by insects or rodents. *Storage* incurs other costs too, including the cost of renting the warehouse and disinfestation charges. A cost which will not be obvious to the farmer is the cost of money or *capital costs*. Even when the trader does not deliberately store maize, the time between paying the farmer and being paid by a mill could be several weeks. In countries where interest rates are high, the cost of money can therefore be significant. There are also lots of *other small costs* to pay and the marketing cost calculation must, of course, include profit for the trader. Without profit people will not trade and there will be no one to buy the farmer's maize.

Packaging

While some large farmers in, for example, Zimbabwe deliver maize in bulk to the mill, this is not a realistic option for traders buying from small farmers. Although some are now looking at the possibility of using small rural silos, in most places bags are required. There are many possible arrangements over bags. Some traders expect the farmer to provide the bag, while others give the farmer a bag in exchange. Others will pay a higher price for bagged maize. Larger traders may supply bags in advance to farmers, although here they run the risk that farmers may sell their maize to other traders.

Whether packaging is a significant cost to traders will ultimately depend on whether the customers eventually return the empty bags, or whether they have to purchase bags each time they visit a producing area. In the calculations made later in Figures 4 and 5 it is assumed they are able to recycle bags and thus the cost of packaging is small as grain bags can be used many times. However, this will not always be the case.

Transport

Maize is transported on the shoulder or head, by bicycle, wheelbarrow, ox-cart, car, pick-up, bus or truck. As most farms are not situated right next to a road, either the farmer or the trader will have to transport the maize to the nearest road without using motorized transport. When the trader does this costs will be increased and the price to the farmer will be lower.

Small-scale traders may buy too few bags at one go to justify hiring pick-ups or trucks. They will either transport bags of maize by bus or on a passing vehicle. It should be remembered that their costs will include not only the cost of transporting the bags but also the amount they have to pay for their own transport to and from the producing area. Smaller traders who move produce in this way often have to take several rides in order to get to their destination. This can both be expensive and time-consuming.

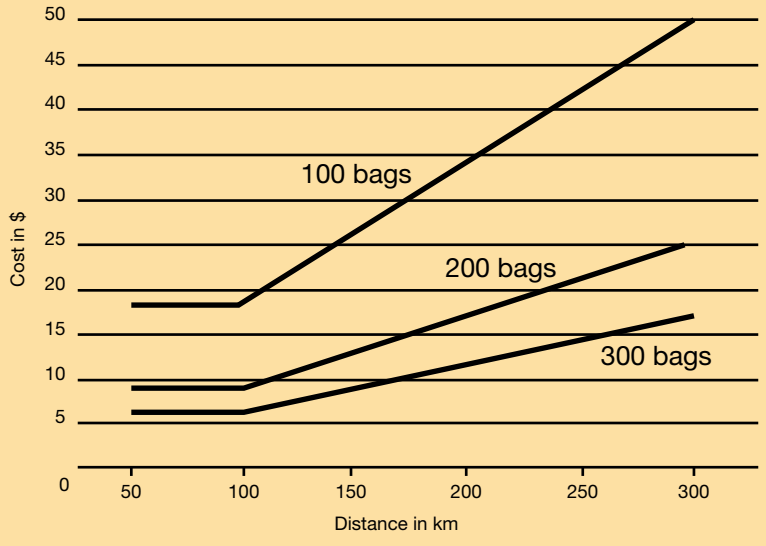
During the maize buying season, there is a lot of produce moving out of producing areas but the volume of produce being transported into these areas is relatively small. Thus trucks travelling to maize growing areas to collect maize will often travel empty. The cost to the trader who hires a truck will invariably be the cost of a two-way journey rather than a one-way trip. This needs to be built into cost calculations. Further, a trader who charters a truck will almost always have to pay a fixed fee for the journey, which takes no account of the quantity that can be loaded onto the truck. If the truck is fully loaded the cost per bag will be significantly lower than if there is spare capacity. Figure 3 on page 48 illustrates this graphically.

Traders delivering to mills sometime have to wait in line at the mill. Many of the mills in the region were set up without much warehousing capacity, it being assumed that they would receive regular deliveries from marketing board warehouses. Although these problems are being

rectified, mills were often slow to take over available warehouses or build new ones. With limited storage capacity at the mills, traders had to wait for other maize to be milled before they could unload their trucks.

In Zambia, it once reportedly took up to five days to unload maize at a mill in the peak season. This adds to costs, both the transport costs and the cost of the trader's time.

Figure 3
Transport costs per ton according to capacity utilization



Note: A fixed charge for the truck is assumed for the first 100 kg, with a charge per kilometre thereafter

Handling
Maize can be handled on many occasions between the farmer and the buyer. Examples of the occasions when maize is handled for a fee when a collector/trader sells maize in a market are:

- packing grain into bags after purchase from the farmer;
- carrying the bags to the roadside;
- loading the bags onto a truck;
- off-loading the maize at the market;
- moving the maize from the vehicle to the selling point;
- cleaning and drying the maize;
- moving unsold maize to a store at the end of the day;
- moving it back to the selling area the following day.

A trader selling to a mill may handle the bags in the following ways:

- packing grain into bags after purchase from the farmer;
- carrying the bags to the roadside;
- loading the bags onto a pick-up;
- off-loading the maize at the store;
- cleaning and drying;
- reloading the maize onto a larger truck;
- unloading the maize at the mill.

Weight losses
The weight traders sell is unlikely to be exactly the same as the weight they buy. If the time between buying and selling is only a few days the loss may only be small, say one percent or so. But if the trader stores the maize for some time and carries out activities to improve the quality of the maize, then the difference in weights can be considerable, even as high as ten percent.

Reasons for losses in weight are discussed below. It should be realized that not all of these losses are food losses. For example, a trader may "clean" the maize. Clearly there is no food loss here but the weight sold is not the same as the weight purchased. When post-harvest food losses are calculated the fact that losses in weight are not all losses in food is sometimes overlooked, thereby creating an impression that the post-harvest and marketing systems are inefficient when, in fact, they may be quite efficient.

Spillage. Spillage can be caused by a variety of factors. Using old bags with small holes in them or failing to close the bags properly leads to maize falling from the bags. Rough handling, for example by throwing bags from trucks, can make the problem worse. Poor roads lead to greater bag movement on the truck, resulting in greater spillage.

Theft. Traders who transport bags on the top of buses cannot guard their bags against theft all the time

because they are sitting in the body of the bus. Traders who do not accompany their maize bags on trucks run the risk that small quantities will be pilfered, either by the truck driver or by passengers. While a handful of maize may be an insignificant amount, many handfuls soon mount up. The potential for such loss has to be built into the calculations of the price traders can afford to pay farmers.

Moisture loss. Maize purchased soon after harvest will probably have a high moisture content and will continue to lose moisture for some time. Depending on the time between purchase and sale this can lead to a fairly noticeable weight loss. Where it is too moist traders may even take steps to dry it. While moisture loss is not a loss of food, it nevertheless represents a cost to the trader and must be built into marketing cost calculations.

Cleaning. Maize bagged by small farmers often contains straw, stones and other "foreign matter". Traders selling in local markets cannot sell such maize and have to clean it before sale. This therefore represents another weight loss. Some farmers often try to defraud traders by deliberately placing large stones or other objects in a bag of maize. In the final analysis it is the other farmers who suffer from such practices as such fraud will affect the price the trader is willing to pay in the future. The extension officer needs to stress this point to all farmers.

Traders may clean maize before delivery to mills but this is not normal practice. Mills often deduct a certain amount from the gross weight of maize delivered by traders, in expectation that it will contain foreign matter. Traders also sometimes try to compensate for foreign matter by paying farmers for less than the full weight.

Damage in storage. Maize held in storage is vulnerable to attack from insects, rodents and birds, particularly if it is not well fumigated or if it is stored outdoors under tarpaulin. This can lead to significant weight loss when the maize is stored for a long period, for example when the trader is storing in the hope that the price will rise at the end of the marketing year.

The best way of treating weight loss in marketing cost calculations is to ask the question …

- ***How much does the trader need to buy in order to sell 100 kg… (or one bag – or one ton)?***

This is the method that is adopted in Figures 4 and 5 on pages 54 and 55 which show two calculations. It is a better method than the more common one which involves simply adding the cost of the lost maize at the end of the calculation. This is because the latter method takes no account of the fact that weight which is purchased, but not sold, nevertheless often has to be transported and stored, and therefore incurs costs.

Maize damaged by insects in storage
can suffer serious weight losses

Storage

Retailers may have to store unsold maize in a market overnight. Larger traders may store maize while they put together a truckload for delivery to a distant mill or because they have no immediate buyer for it. A major reason for storage is to take advantage of price rises later in the season.

There are four basic types of storage cost:

- the charge made by the warehouse owner for storing the bags of maize or, where the store is owned by the trader, the depreciation in the value of the store (or tarpaulin) and the cost of operation (electricity, etc.) and maintenance;
- costs associated with the maintenance of quality while the maize is in store, for example, the cost of chemicals;
- losses in quantity while the maize is stored. There is also the risk with long-term storage that the maize will also suffer a loss of quality, so reducing its value;
- capital costs (see page 53).

A note on inflation

To simplify presentation, the calculations shown in this Guide take no account of inflation. Unfortunately, many countries continue to experience rapid price increases and extension workers must bear this in mind when advising farmers on which crops to grow, on whether to store and on how and when to market. Many farmers have problems in understanding the concept of inflation and in realising that although the price they get for their maize may be going up they are not necessarily better off. To help understand the impact of inflation we use the idea of the "*real"* price.

Let us first begin with this simple example:

The maize price in May is:	$ 100
The maize price in November is:	150
The price increase is:	50
Farmer's storage cost for six months is:	20
Farmer's *profit* from storage is:	$ 30

Here it looks like storage is a good idea. However, if we now calculate the "*real*" price then the picture changes dramatically. Let's, for this example, assume inflation is around 60 percent a year and that in the period May-November prices went up by 30 percent. Then:

The maize price in May is:	$ 100
The maize price in November is:	150
The "real" maize price in November is:	115*
The "real" price increase is:	15
Farmer's storage cost for six months is:	20
Farmer's *loss* from storage is:	$ 5

Thus, inflation can turn an apparently profitable activity into a loss-making one.

Considering a different situation, let us assume that farmers have two choices in selling maize. They can sell to a trader who will pay $100 in cash now or can sell to a trader who will pay $110 in two months time. However, if inflation is rising by 5 percent per month, the "*real*" price in two months time is $100. So there is no reason for the farmer to sell to the second trader.**

Since it is somewhat difficult for farmers to understand the idea of inflation, extension workers can help them understand by relating prices to the cost of buying things. For example, if the farmer sells his maize for $100 in May, how many bags of fertilizer will he be able to buy with that money? How many will he be able to buy in November? Inflation means that he will be able to buy less in November than in May.

* The "real" price is calculated by dividing the actual price by the percentage prices have gone up plus 100. The result is then multiplied by 100. Hence, with 30 percent inflation, the real price is ($150 ÷ 130%) x 100 or $115.

** This is because farmers could put the $100 in the bank and earn interest or could spend the $100 buying household supplies or farm inputs, before prices go up. See Chapter 7 for a discussion on encouraging farmers to save.

Capital costs

Capital costs may not be very visible but they are extremely important. To operate, traders may have to borrow money from a bank, from relatives or from a moneylender. The interest paid on that money is a cost. If traders use their own money it cannot be said that they have no costs because they could have left the money in the bank to earn interest, instead of using it for trading. The cost of using own funds is thus the interest that is not received. Economists call this an *opportunity cost*.

Several countries in the region have high interest rates, which can fluctuate rapidly. It is thus often in traders' interest to sell maize as quickly as possible. Unfortunately, it is not always easy for traders to get their money back quickly. Mills may not pay on delivery. They may require a period of credit, which can be as much as a month, and then may not always pay at the end of the agreed period.

Buying from farmers can also take time. Traders may spend several days going from farmer to farmer in order to put together a truckload. If they pay cash, they are paying interest on that cash all the time they are buying.

Other costs

There are lots of small costs that traders may face. Individually they may be small but all added together they can be quite significant.

- it is often necessary to weigh the maize and a payment has to be made to the weighbridge or person in the market offering a weighing service;
- traders selling in markets usually have to pay market fees;
- some local councils, provinces, etc. may levy taxes on maize marketed or transported in their area;
- police and other officials may levy "unofficial" taxes at road blocks or in markets;
- larger traders have overhead costs, such as office accommodation and phone and fax charges.

MARKETING COST CALCULATIONS

Figures 4 and 5 give two cost calculations. The first of them refers to maize purchased by a small-scale collector/trader and sold in a local market. The second refers to maize purchased by a large-scale trader, stored in town and then transported to a distant mill. The figures are hypothetical and are used only to show how costs are calculated. They do not represent actual costs in any country.

Figure 4

Calculating marketing costs – Small trader

Assume an example involving a small trader selling maize in a local market as follows…

Purchase of 1.02 tons* of maize at $100 per ton	=	$102.00
Transport to roadside of 20.5 bags (50 kg) at $0.50 per bag	=	10.25
Transport to town market of 20.5 bags at $1.00 per bag	=	20.50
Transport and accommodation for trader	=	15.00
21 bags at $1.00 per bag ÷ 10**	=	2.10
Overnight storage and handling	=	5.00
Market fees and overheads	=	5.00
Subtotal		$159.85
Interest for 1 month at 5% per month	=	8.00
Total		$167.85
Sale of 1 ton at $200 per ton	=	200.00
Profit		$32.15

* 1.02 tons purchased in order to sell approximately one ton of maize in a local market after 2% weight loss

** Assume that each bag can be used ten times

Figure 5
Calculating marketing costs – Large trader

Assume an example involving a small trader selling maize to a large mill as follows…

Purchase of 1.05 tons* of maize at $100 per ton	=	$105.00
Transport from rural area to town of 21 bags (50 kg) at $1.00 per bag	=	21.00
Transport from town to mill of 21 bags at $1.50 per bag	=	31.50
Handling costs and accommodation (two employees for two weeks)	=	3.20
21 bags at $1.00 per bag ÷ 10**	=	2.10
Minor costs and overheads	=	3.00
Storage in town	=	2.00
Subtotal		$167.80
Interest for 1.5 months at 5% per month	=	12.60
Total		$180.40
Sale of 1 ton at $220 per ton	=	220.00
Profit		$39.60

* 1.05 tons purchased in order to sell approximately one ton of maize in a local market after 5% weight loss
** Assume that each bag can be used ten times

5 Drying and storage

Main points in Chapter 5
Drying and storage

The usual post-harvest stages for maize

- *Field drying on stalk*
- *Harvesting and stocking*
- *Transport from field*
- *Temporary storage*
- *Drying*
- *Husking*
- *Shelling and cleaning*
- *Storage*
- *Marketing*

Principles and practice of drying

- *Reasons for drying*
- *On-farm drying*
- *Using a rectangular crib for drying*

Principles and practice of storage

- *Reasons for storing*
- *Types of storage*
- *Managing storage in a solid-wall bin*

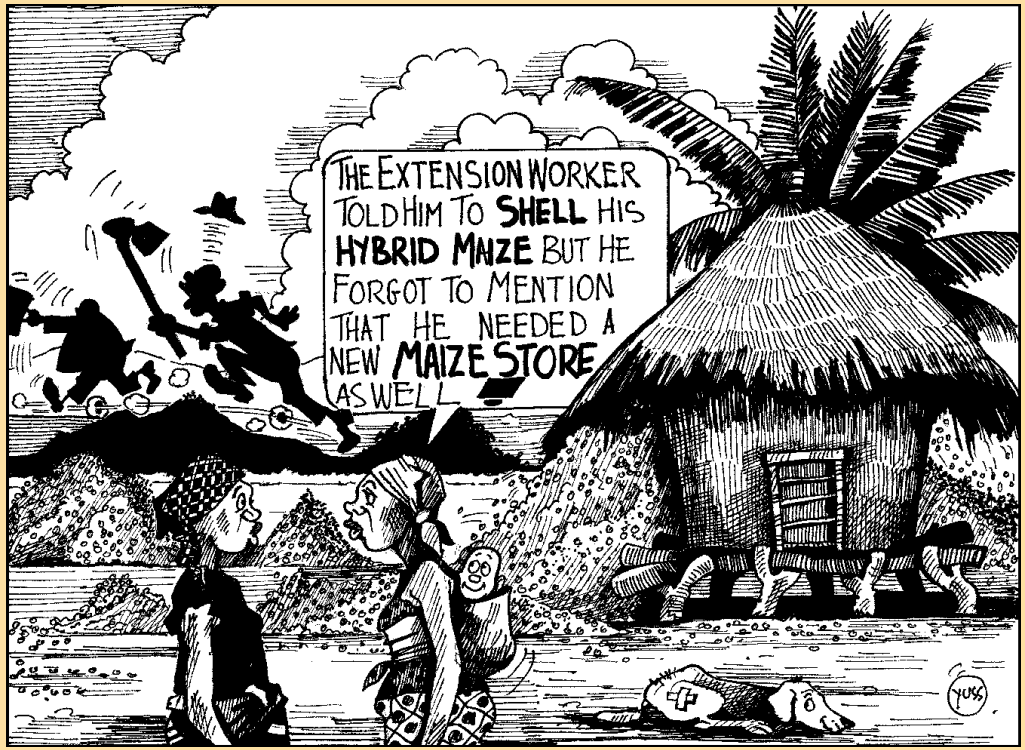
Calculating storage viability

- *Calculating costs of construction*
- *Other costs*
- *Profitability of storing*
- *Using price trends*
- *Calculating storage profitability*

The Larger Grain Borer

- *Awareness, identification, remedies*

Hybrid maize has shorter and looser husks
than traditional varieties of maize.
Because of this, hybrids are not as well protected
and are best stored shelled and not on the cob.



Since traditional storage is not suited for shelled maize,
farmers may need to consider a new kind that is.

INTRODUCTION

In the days, of marketing boards farmers only stored marketed maize for a short period. As we have seen, nowadays farmers are faced with a wider variety of marketing situations. If there is a buyer they can sell their maize immediately and not worry about storage but if there is no buyer then they have to store their maize until such time as they can arrange sale. Moreover, farmers may deliberately want to hold on to their maize for some months in the hope that the price will rise.

Storage requirements have therefore changed significantly from the days when farmers only had to worry about storing their own food requirements and some seed for the following planting season. This was nearly always a local variety of maize and was stored on the cob, without use of pesticides, in an open store. However, maize for marketing is now mainly hybrid maize which, because of its shorter and looser husks, should ideally be stored shelled in a closed store with the use of pesticide. In fact, the spread of the Larger Grain Borer in parts of Africa makes the use of good storage essential.

The extension officer therefore needs to be able to advise farmers on:

- whether or not to construct a new store;
- which type of store to construct;
- how to construct it;
- how to prepare maize for storage;
- how to use pesticides;
- how to control the Larger Grain Borer.

This chapter first reviews basic principles of drying and storage and the practice in the region and then considers how farmers can calculate the viability of an investment in a new store. Finally, it looks at what extension workers can do to help stop the spread of the Larger Grain Borer.

Note: A detailed description of different types of on-farm drying and storage is beyond the scope of this Guide, although a few are illustrated in this chapter. However, national extension services should recommend drying and storage methods based on local conditions, and make these recommendations available to all extension officers, together with information on construction methods and costs and on the potentialbenefits in relation to the costs.

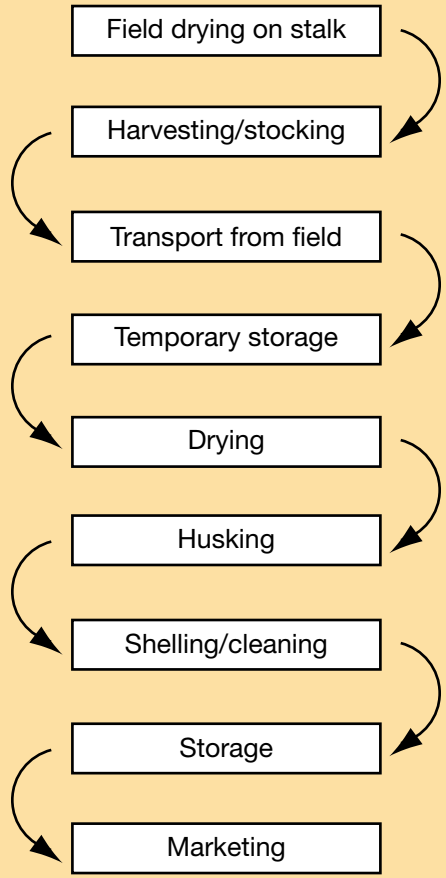
DRYING – PRINCIPLES AND PRACTICE

Figure 6 illustrates the stages that maize can go through after reaching maturity in the field. Maize reaches physiological maturity between 130 and 160 days after planting, depending on the variety. At this stage the crop has a moisture content of about 30 percent, and can be harvested, provided that adequate drying facilities are available. However, small-scale farmers often harvest their maize long after it has reached physiological maturity, largely because they lack suitable drying facilities. Harvesting may be delayed by up to two months in order to allow the maize to dry. In some countries it is also common for the cobs to be left in the field for a further period, on piled, cut maize stalks.

Delayed harvesting leads to many problems. In general it can be said that the longer maize stays unprotected in the field after it has reached full maturity, the higher the losses. Reasons for this are:

- it is exposed to attacks by termites, rodents and domestic animals;
- it can be infested by insects.

Figure 6
Usual post-harvest stages for maize



Box 3
Reasons for drying

1. Maize is physiologically mature, that is it ceases to grow and accumulate more dry matter, when the grain moisture content ranges between 30 and 35 percent. At this stage, the grain is still a living organism and, as such, it respires.

2. Respiration causes the production of heat, carbon dioxide and water. The higher the temperature and moisture content, the higher the respiration rate and the higher the loss of dry matter.

3. The ideal moisture content for storing maize is below 13 percent. For every 1.5 percent of moisture content above that grain deterioration doubles.

Note: It is thus essential that farmers dry their grain to recommended rates if they are to store it for any length of time.

Box 4
On-farm drying

An appropriate drying facility for use by small farmers should:

1. Enable the farmer to avoid field drying by permitting adequate drying of maize with a starting moisture content of around 30 percent.

2. Utilize locally available building materials where possible.

3. Protect the maize against termites, rodents and other animals.

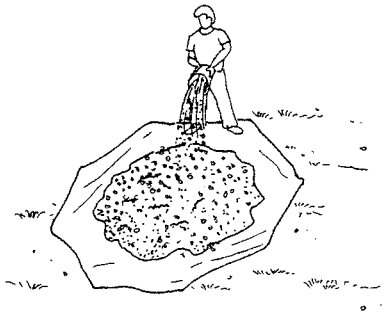
4. Protect the crop against rain.

5. Not require too much skill to construct.

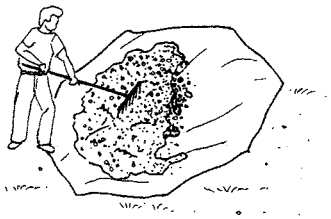
6. Be affordable.

Two simple methods that can be used to sun-dry shelled maize after it has been partially dried on the cob are:

- drying on a plastic sheet on the ground;
- drying in a drying tunnel.

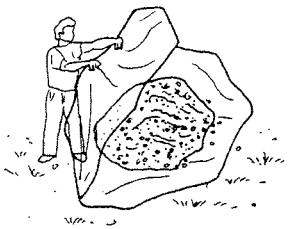


1 Spread shelled maize no more than 5 cm deep on the plastic sheet

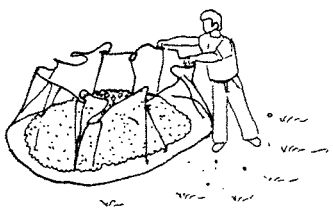


2 Rake the maize from side to side while it is drying

Sun-drying shelled maize on a plastic sheet on the ground



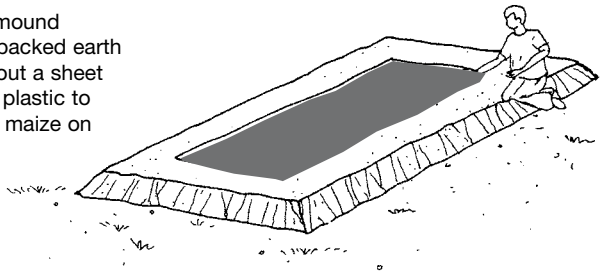
3 Protect the maize at night by folding the sheet in half

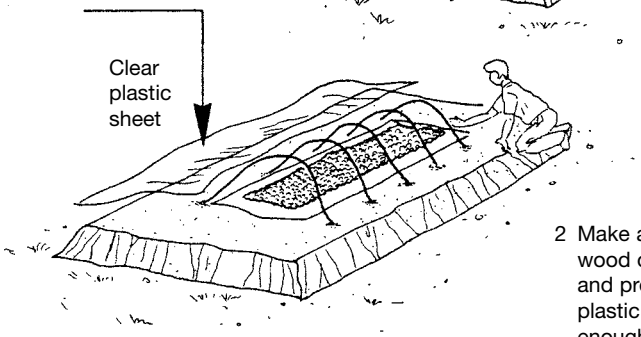


4 You can also gather the edges of the sheet to form a sack

5 Tie the sack and carry the maize inside at night

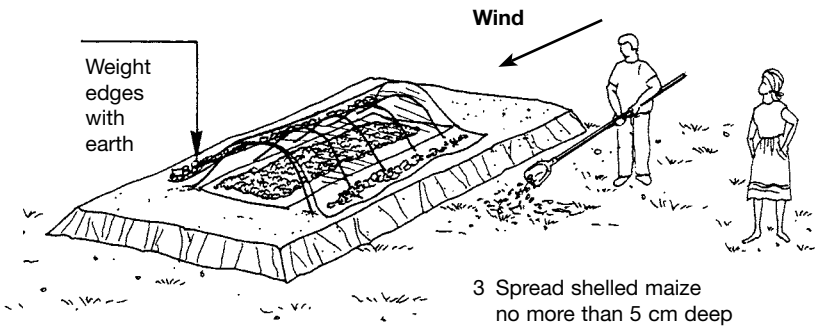
1 Build a mound of hard-packed earth and lay out a sheet of black plastic to dry your maize on





2 Make a frame of wire, wood or bamboo and prepare a clear plastic sheet large enough to cover it

Sun-drying shelled maize in a drying tunnel



3 Spread shelled maize no more than 5 cm deep on the black plastic, cover the frame with the clear plastic and weight edges with earth

When maize is brought in from the field it is often divided into two. Maize reserved for family consumption is placed in traditional stores, unhusked. The maize the farmer intends to sell is generally husked and placed on raised platforms or fenced bare ground, where additional drying is done before shelling and storage in bags. Existing drying methods are, however, often unsuitable for handling large quantities of maize cobs at high moisture levels. Reasons for this include:

- the layer of maize cobs is often too thick, resulting in those at the top drying quickly to a safe moisture content while those in the middle remain too long at a high moisture content;
- the drying rate is too low, favouring the development of moulds;
- it is difficult to protect the maize against termites and rodents.

An example of a suitable drying structure is the improved rectangular crib (see also pages 69 and 71). Such a crib could allow for maize harvested at 30 percent moisture content to be dried on the cob to recommended rates in about six weeks. At this time it would be ready for shelling, treatment with insecticide and safe storage. An advantage of this crib is that it can also be used to store bagged and treated maize in quite good condition. Experiments in the region suggest that the storage of maize in bags in this way compares favourably with the storage of maize in solid-walled bins.

A drying and storage crib, used normally to store maize on the cob, can also be used to store shelled maize in bags.

Improved maize crib after removal of stored cobs – Madagascar

Box 5
Using a rectangular crib for drying

Pre-loading. Maize should be put in the crib only after the crib has been well cleaned and repaired. Preferably, a liquid insecticide should be applied to the inside.

*Loadin*g. The maize should be harvested soon after maturity at a moisture content of around 30 percent. The cobs should be husked and any affected by insects or mould should be discarded.

Drying. In a well-designed and built crib the moisture content should go down to around 14 percent within about six weeks.

Emptying. Maize should not be kept on the cob for more than two months as this will lead to heavy insect infestation and losses. The crib should be emptied after 6-8 weeks through a door at floor level or by removing a couple of floor boards to allow the cobs to drop into a container placed below the crib. (The maize can then be shelled, treated with insecticide, placed in bags and put back in the crib).

STORAGE – PRINCIPLES AND PRACTICE

A store serves the following purposes. It provides protection against:

- ground and rain water;
- insect and other pests;
- excessive heat.

As previously noted, farmers' storage requirements have changed in recent years, as a result of marketing liberalization. But there are other changes affecting storage, which are not so obvious but can have a significant effect both on farmers' storage needs and on their ability to meet these needs.

Such changes include:

- *increased likelihood of drought.* This has two implications. First, farmers need to consider storing more maize for their own consumption and, second, the droughts have been one factor affecting the availability of the preferred wood for building stores and of plant materials traditionally used as insect repellents;
- *the spread of the Larger Grain Borer.* The effects of the Borer can be devastating. Damage can be reduced by following correct storage procedures;
- *introduction of hybrids.* Local maize varieties have been traditionally stored in open-to-air structures, with several layers of husk tightly covering the cob, providing some protection against common insects. Hybrids, with shorter and looser husks, do not offer the same protection, although new varieties with better storage characteristics are being introduced.

There are many types of store in the region. They will not be described in great detail here as it is important that extension workers follow national or local recommendations. The following general types of maize storage can, however, be identified:

- drying and storage crib;
- mud or cement-plastered basket;
- brick bin;
- ferrocement bin (Ferrumba).

The drying and storage crib, and the mud or cement-plastered basket are examples of more traditional storage. The brick bin and the ferrocement bin are examples of improved storage. While improved storage may be better, it is also more costly. If improved storage is beyond the reach of the small-scale farmer, traditional methods can be improved upon. Some photographs of these kinds of storage are shown on the following pages. Brief descriptions of their construction and some illustrations of improved storage methods are also shown.

Traditional cribs

Storing maize in a crib on the ground

Maize crib roofed with thatch

Traditional baskets

Open-basket storage

Close-up of basket mud-plastered inside and on top

Brick bins

Bins roofed with thatch

Forming a brick grain chute

Bins roofed with brick

Beginning to inset top bricks to form roof

Mud or cement-plastered basket

The traditional basket storage is made with walls of light branches, split bamboo or other woven material. It can be improved by plastering both the inside and the outside with either mud or cement mortar. A plastered basket provides additional protection against the Larger Grain Borer. The normal base for this kind of storage is a wooden platform at least 75 cm above the ground. If a wooden platform is used, the posts should be treated against termites and fitted with rat guards. However, the storage can be further improved by using a stone base topped with either mud or cement mortar. The entire basket should be protected by an overhanging detached roof or even a permanent roof structure. See page 70 for illustrations of various details for the improvement of a plastered-basket storage.

Rectangular drying and storage crib

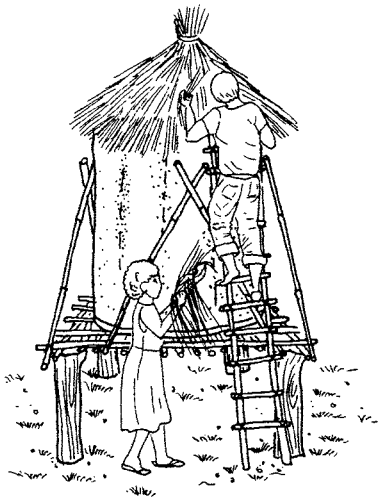
As noted earlier this kind of crib can be, and often is, used for storage of shelled maize in bags, after that maize has been dried on the cob. Ideally, the crib should be rectangular with an interior width of 60-70 cm, but never more than one metre. It should face the prevailing wind during the drying season and have a floor structure at least 75 cm above the ground. The posts should be treated against termites and fitted with rat guards. Cribs should be erected a good distance from the fields to reduce insect infestation and their location should be free of grass, bushes, waste maize and water. See page 71 for illustrations of various details in the construction of an improved rectangular drying and storage crib.

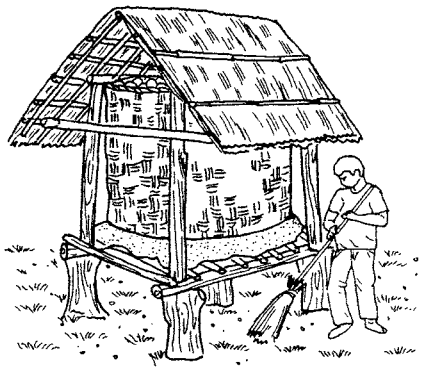
Brick bin

The walls of this kind of bin are usually built with burnt clay bricks and plastered with either mud or cement mortar, although mud bricks may also be used. The foundation is made of stone topped with cement mortar or a concrete slab and, if it is available, covered with polythene sheeting. A chute to remove grain is set into the first rows of bricks as the walls are built. When finished the structure is plastered with mud or cement mortar both inside and outside. This bin is closed with a poured concrete lid which has a manhole cover in the centre. When the bin is finished and ready for use, it should be further protected by an overhanging detached roof or even a permanent roof structure. See page 72 for illustrations showing various details in the construction of a round brick bin.

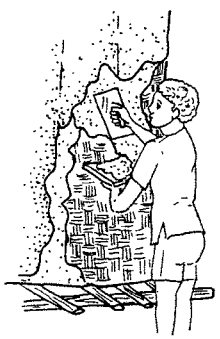
Mud or cement-plastered baskets

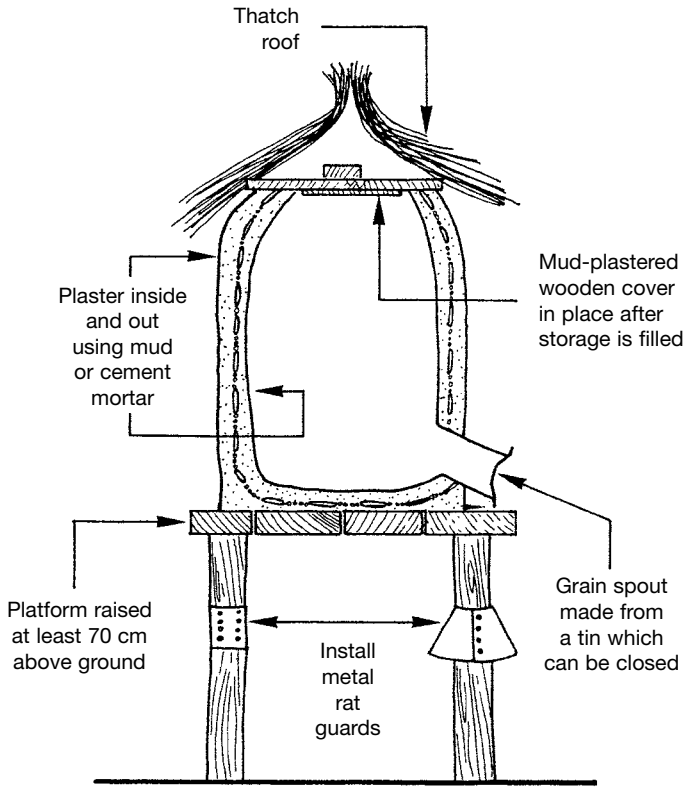
1 Examples of traditional basket storage which can be improved by raising the floor at least 70 cm above ground, providing rat guards and …





… plastering the walls with mud or cement mortar inside and out

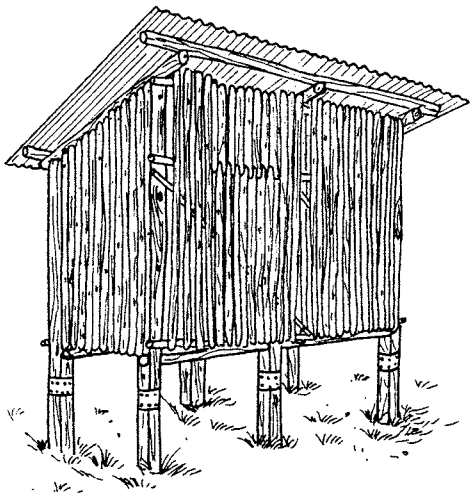




2 Section through improved basket storage

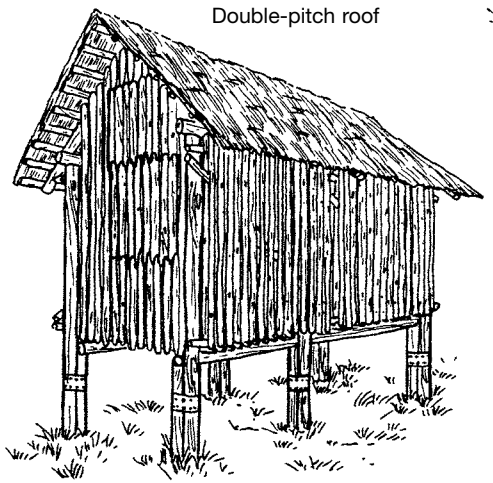
Improved rectangular drying and storage cribs

Single-pitch roof

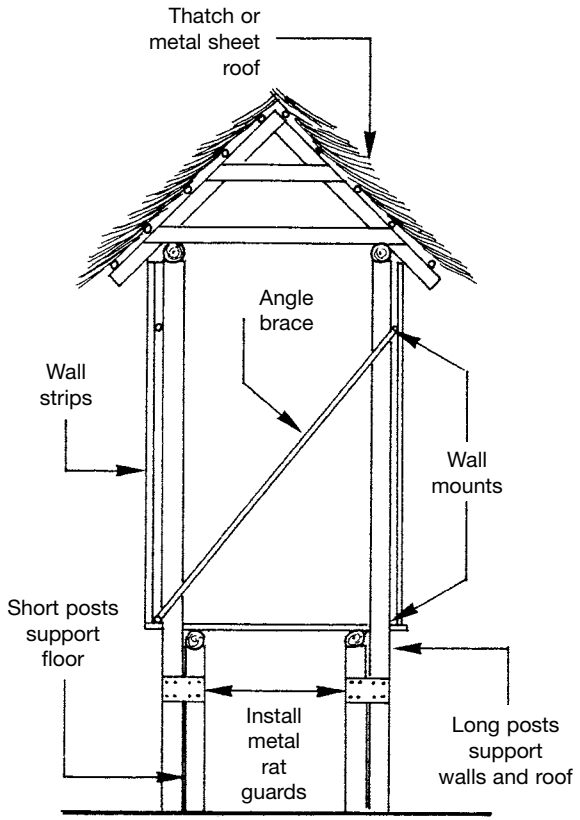


1 Examples of rectangular drying and storage cribs

Double-pitch roof

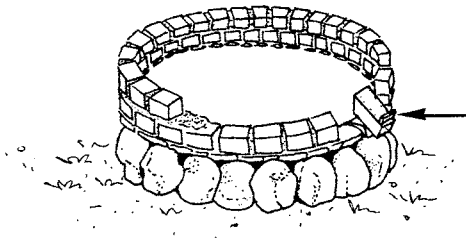


Note: Angle braces are needed between each of the long posts to insure stability of the crib (see section).

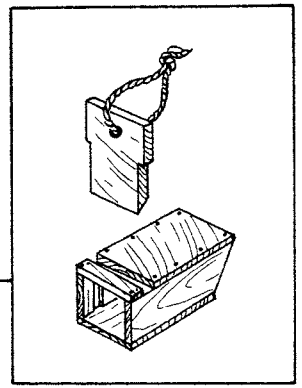


2 Section through a drying and storage crib

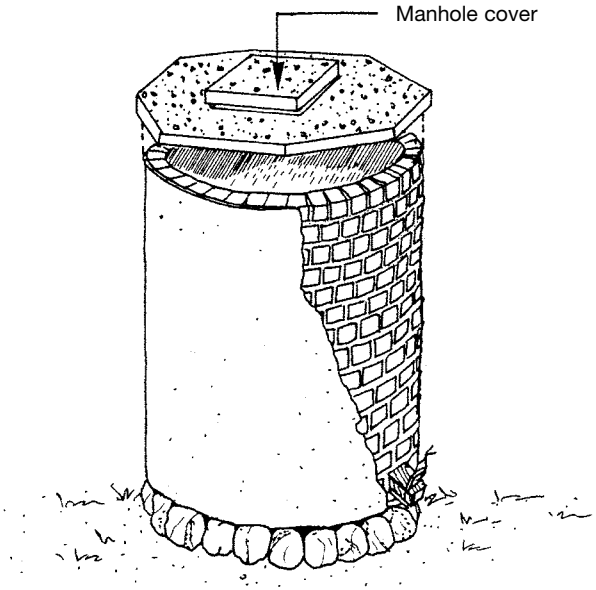
Brick bin



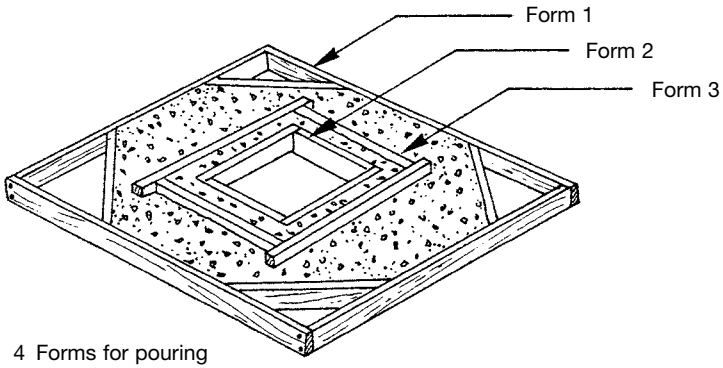
1 Stone base topped with cement mortar and a chute to remove grain set at floor level



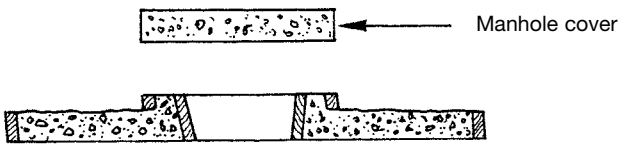
2 Detail of a wooden chute with sliding door (a photograph on page 68 shows a chute built using bricks)



3 Plaster inside and out and position concrete lid with manhole cover



4 Forms for pouring concrete lid



5 Section through lid showing forms in place after pouring concrete

Ferrocement bin (Ferrumba)

This bin is built using chicken-wire reinforcement and cement mortar. A wooden frame built of light, straight tree branches or used wooden strips forms the shape and holds the chicken wire in place until the outside cement mortar is applied. The foundation is ideally made of stone, but the bin can also be supported by a termite-resistant wooden platform. The top opening of the finished structure, which is wide enough for a man to enter, can be covered with either a cone-shaped lid (also made using chicken-wire reinforcement plastered with cement mortar) or a flat cement lid. When the lid is in place on top of the bin, a bicycle tyre or a strip of rubber around the opening will ensure a tight fit. This bin was widely promoted by technical assistance projects in Eastern and Southern Africa. However, its use by farmers in the region has been limited, partly because of the construction costs.

Ferrocement bin with grain chute –
flat cement lid in foreground

Box 6

Managing storage in a solid-wall bin

1. A new store should not be used for at least six weeks after completion of construction, in order to dry out the cement and to repair minor cracks that may develop.
2. The inside floor and walls should be carefully cleaned to remove all dust before loading the grain into the bin. This should be done even if the bin is new.
3. Infestation can be reduced by early harvesting and only selecting good ears.
4. Insecticides can be used, but should be used with care. Recommendations of the relevant government authority should be followed closely.
5. When loading and unloading the bin, care must be taken not to damage the structure.
6. If grain unloaded from the bin shows any sign of mouldy odour or high insect infestation, the bin should be immediately emptied and treated or dried, as appropriate.
7. All bins require maintenance. Mud-plastered structures should be inspected from outside every two weeks when grain is in the bin and monthly otherwise. This is to avoid losses from insects, which can penetrate the walls through cracks, as well as to reduce the risks that the whole structure will disintegrate. Cement-plastered structures should be inspected at least once a year and repairs carried out two months before the bin is to be loaded with grain again. Foundations should be kept firm to avoid leaning of the floor and wall structure, which will cause considerable cracking. The foundation should be checked every year and wood preservative should be added to poles every year.

CALCULATING STORAGE VIABILITY

Calculating the benefits of improved storage is not easy. Benefits could be measured in terms of reduced losses. However, if farmers use *unimproved*, *traditional* maize storage structures for the long-term storage of hybrid maize meant for the market, their losses through insect infestation, rodents and other damage are likely to be far greater than the benefits through getting a higher price. This will certainly be the case in areas affected by the Larger Grain Borer.

The questions a farmer has to ask are…

- ***Do I want to sell all my maize as soon as it is dry enough to sell or do I want to calculate the benefits of waiting until the price goes up to sell some of the maize?***
- ***If I want to sell it as early as possible, can I be sure that I will find a buyer at a reasonable price?***

If farmers want to keep back some maize for later sale at a higher price or if they are not sure that they will find a buyer early in the season, then they will probably have to make some investment in improved storage. It may be that improvements to a traditional crib will be adequate. In other circumstances, however, the farmer may have to invest in improved stores. The extension worker needs to be in a position to advise the farmer whether it is worthwhile to make that investment or not. The price of a new store may seem very high to farmers and they may be reluctant to make the investment, even though it could benefit them in the long run. To advise farmers on the viability of storage, extension workers need to:

- know the costs of constructing a suitable store (see Figure 7);
- estimate how much more money the farmers are likely to earn in an average year if they store, rather than sell immediately;
- know the costs of storing.

Costs of storing

Assuming that the farmer does not have any labour costs to prepare maize for storage and to load the maize into the store and take it out again, then storage costs are: insecticides (if used), bags (where the maize is stored in bags) and maintenance of the store.

Extension workers need to know the recommended rate of application for insecticides and ensure that farmers follow the recommended procedures. They also need to know the price of insecticide in the quantity required by the farmer.

Figure 7
Calculating costs of storage construction

Costs for storage construction have to be calculated on the basis of local construction methods and construction material prices. A well-informed extension officer will be able to assist the farmer in determining costs. The following outlines will be of help ...

Brick bin	Costs
Number of bricks required x cost per brick	
Bags of cement required x cost per bag	
Labour (bricklayer): Number of days x daily cost	
Total cost	

Profitability of storing

It is important to realize that farmers are not building a store for just one season. They would be unlikely to get their investment back in one year. A well-constructed bin, regularly maintained, can last for many years. Thus, when deciding to construct a store they need to be asking…

not

- ***What benefit will I get from storing my maize next season?***

but

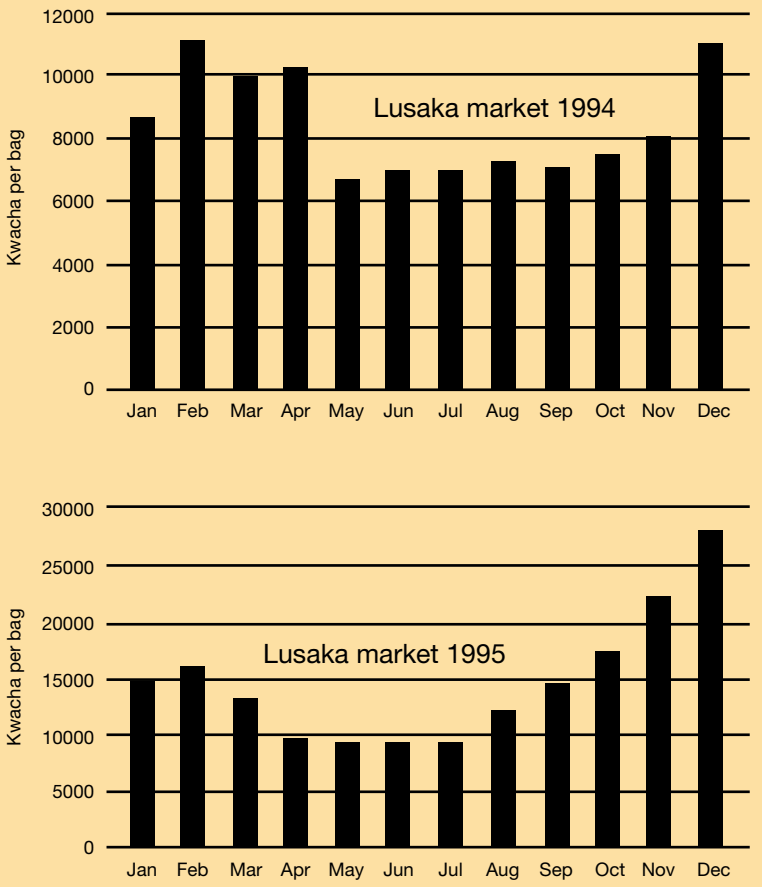
- ***What benefit can I get from storing maize in the next five seasons?***

In countries where there are functioning market information services, information should be available concerning seasonal price movements. The Market Information Service, should analyse annual price trends and make this information available to extension workers. As an example, Figure 8 illustrates price trends in Zambia. The extension worker will, of course, have to translate prices in urban areas into farm-gate prices.

On the basis of such information an informed guess needs to be made as to how much the maize price is likely to rise in an average year. That does not mean storage will always be viable because in some years the crop may be so large that storage in hope of a higher price later in the season will not be justified.

Figure 8

Seasonal price trends in Zambia



Farmers who sell their crop immediately after drying could put the money in the bank and earn interest. In this case they clearly need to earn more from storing than they would by putting the money in the bank. This has to be taken into account in calculating storage profitability, as does the impact of inflation (see Chapter 4). Of course this does assume that farmers have easy access to saving facilities, which may not be the case.

If reliable information on price trends is available it is possible, ignoring for the time being the cost of constructing the store, to assess the profitability of storage, as shown in Figure 9. The calculation assumes that correct storage techniques are used and that no maize is lost through insect damage.

In the brief discussion on the Larger Grain Borer (LGB) in the next section, we note that farmers in the LGB areas who want to store maize for any length of time will have to invest in new stores. The potential losses from the LGB are so high that farmers cannot consider long-term storage using traditional methods unless those methods are greatly improved.

Thus, farmers will have to answer the question…

- ***Can I or should I sell my maize immediately after harvest?***
  or
- ***Should I keep it in good-quality storage for sale later in the season?***

From the calculations illustrated in Figure 9, we can see that storage in this example is profitable when the farmer keeps maize until at least January of the following year. However, that calculation does not include the cost of the store. Farmers who do not have to store, that is they are able to sell their maize fairly soon after harvest, therefore need to do one further calculation. See Figure 10 for an example of this calculation.

In this, hypothetical, example constructing a store represents a good investment for farmers. However, the actual calculation will depend on local building costs and local maize prices. It should also be noted that as more and more farmers build stores in order to sell their maize later in the season, the amount by which prices rise over the year is likely to become smaller, so reducing the potential profitability of storage.

Figure 9
Calculating storage profitability per ton in $

	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Costs									
Annual maintenance and Insecticide	20	20	20	20	20	20	20	20	20
Bank interest lost	2	4	6	8	10	12	14	16	18
Crop value in July	100	100	100	100	100	100	100	100	100
Total storage cost	122	124	126	128	130	132	134	136	138
Selling price	100	100	105	115	130	145	160	165	160
Storage profitability	-22	-24	-21	-13	0	13	26	29	22

Note: Bank interest on deposits assumed to be 2% per month

Figure 10
Calculating storage viability

1 Estimated cost of store construction	$120.00
2 Cost per year over five years ($120.00 ÷ 5 years)	24.00
3 Cost per ton stored per year (2 ton/year in this example).	12.00
4 Maximum benefit from storage per ton/year (Figure 9/March storage profitability)	29.00
Potential storage benefit per ton/year (4 minus 3).	$17.00

SOCIO-ECONOMIC ASPECTS OF STORAGE

New storage designs may be technically perfect but that does not mean that farmers are going to use them. For example, the ferrumba bin illustrated previously was widely promoted in Zambia but is now no longer being promoted. Instead, extension efforts are being placed on encouraging farmers to make improvements to more traditional designs. Reasons why stores may not be used by farmers include:

Costs versus benefits. Farmers need to see that constructing a new store is going to make them better off. If a new bin could reduce losses by, say, 5 percent of the total harvest, farmers need to consider how long it would take to repay the investment. If the saving is worth $20 a year and a store costs $200 many farmers may decide to continue to accept the losses. Farmers are more likely to want to invest in a new store if they plan to sell the stored maize when the price goes up, rather than use it for their own consumption.

Poor access to credit. Raising the money to pay for a new store can present farmers with major problems. There may be no banks in their area or banks may be reluctant to lend them money. Further, the benefits, in terms of food loss avoided, may not be enough to cover the interest and principal repayment.

Poor access to chemicals. Some types of store require the use of specific pest-control chemicals in order to be effective. A problem that farmers sometimes face is that there are no retailers in their area who sell the chemicals, or that the retailers have run out of stock. Some storage structures require fumigation. As this can be a very hazardous operation if not carried out correctly, it is not generally recommended for smallholders to do.

Maize moisture levels. Maize stored in sealed containers must have a moisture level of below 15 percent. In humid areas it can be very difficult for farmers to dry their maize to such levels without artificial drying equipment, and this equipment is usually not available in rural areas. In some climates, large day-night temperature variations increase the risk of condensation inside the store, resulting in increased maize moisture content. This requires that maize be regularly inspected and, if necessary, removed from the store and redried. This represents additional work for the farm family.

Visibility to others. A common form of storage is for dehusked maize to be kept in bags inside farmers' houses. There are several reasons for this. First, if the house is large enough it avoids having to construct a store; second, storage indoors reduces the possibility of theft. Finally, outside storage shows other people how much maize the family has; something that they may not want known.

Mixing consumption storage with market storage. Families both consume and sell their maize production. Some types of store, such as the hermetic cocoon or those that are used with fumigation, are designed for storage over several months and should be left sealed for that period. Thus they are unsuitable for storage of maize for daily consumption. Farmers may therefore prefer traditional stores that can be opened easily every day or every few days.

THE LARGER GRAIN BORER

The Larger Grain Borer (LGB), *Prostephanus truncatus*, was accidentally introduced into the region, probably in a consignment of food aid from Central America. In its natural environment the LGB does not in general present a major threat for stored maize. This is because of different storage practices and because of the presence of natural enemies, in particular a predatory beetle that preys only on the LGB. In Africa there is no predator and the LGB has been spreading rapidly in East Africa

Maize cob reduced to powder by the LGB

It is now found in most of East Africa as well as in Niger, NIgeria and surrounding countries.

The LGB is a major pest for stored maize, in particular maize on the cob, and for dried cassava. However, it also develops populations in forests, where it feeds on wood. It is improbable that the LGB can ever be entirely eradicated in the region, but farmers can protect their stored produce against it and other storage pests by following recommended practices. The predatory beetle, *Teretriosoma nigrescens*, has been released in most affected countries and this is expected to keep LGB populations at tolerable levels.

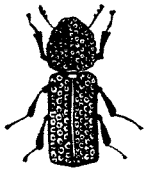
Sack of maize
totally infested by the LGB

The Larger Grain Borer can be contained but this requires a major communication and extension effort which will involve every extension officer. Each affected country in the region has its own programme of control. Such a programme is likely to involve extension workers in the following ways:

- by contributing to LGB awareness campaigns, both among farmers and traders;
- by advising on the best types of stores, storage practices and use of insecticides to counteract the LGB, as well as other pests;
- by identifying outbreaks of the LGB in their area and by monitoring the insect when required by national authorities;
- by assisting, when required by national authorities, in the release of *Teretriosoma nigrescens*.

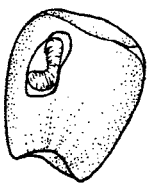
Note: The danger posed by the Larger Grain Borer cannot be underestimated. The damage it can cause to stored crops is *much* higher than other common storage pests. LGB can cause losses of between 30 and 40 percent of dry weight of maize stored over a three to six-month period and up to 70 percent in the case of dried cassava.

LARGER GRAIN BORER
Prostepanus truncatus
(Horn)

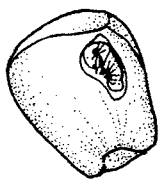


Enlarged adult

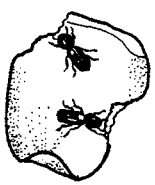
Actual size



Larva in kernel of maize



Pupa in kernel of maize



Adults eating

What it looks like

- Shiny, dark brown
- Head turned down under body
- Strong jaws which cut wood
- 3-4 mm long

Where it lives

- In MesoAmerica and Africa south of the Sahara
- In maize, dried cassava and sweet potatoes

Life cycle

- Life cycle is completed in about 25 days depending on temperature and moisture content
- Each female lays 300-500 eggs

Eggs

- Laid inside insect-damaged kernels
- Hatched in about 3-7 days

Larvae

- Crawl inside damaged kernels eating flour left by boring adult beetles
- Finish growing inside kernels
- See illustration of larva inside kernel of maize

Pupae

- See illustration of pupa inside kernel of maize

Adults

- Cut their way out of kernel
- Feed on the kernel
- See illustration of adults eating

Two existing characteristics of rural maize storage in the region contribute to the spread of the Larger Grain Borer:

- the use of traditional, wood-based storage structures;
- the practice of storing maize on the cob.

Wood-based storage structures: LGB belongs to the woodborer family of beetles. This enables the survival of the insect away from stored grain and between harvests. It also means that stores constructed from wood offer no protection against the LGB. An important role for extension workers is therefore to encourage farmers to construct brick bins or other non-wood structures.

Storing Maize on the Cob: The traditional practice of storing maize on the cob has two disadvantages which make it unsuitable when trying to overcome the Larger Grain Borer. As noted earlier, traditional storage is not suitable for hybrid varieties. These are susceptible to infestation due to having shorter and looser husks which do not offer the same protection as the husks of traditional varieties and allow access to the grain immediately after the cob has reached physical maturity. Moreover, the grain of hybrid maize is softer than that of traditional varieties. Further, storage on the cob means that the maize cannot be effectively mixed with insecticides, which are now almost essential to provide protection against the LGB.

Extension officers need specific information to help farmers combat the LGB. This information should be available from national authorities such as ministries of agriculture and includes:

- construction and management of suitable stores for shelled maize;
- effective use of insecticides. In 1997 the recommended treatment for most of the region was 100 gr of *Actellic Super*, mixed with a 90-kg bag of maize;
- improved cultivation practices. Early harvesting, avoidance of field drying, use of varieties with good husk cover, disposal of maize stover after harvest, burning of cob cores after shelling and removal of obviously damaged cobs are all ways in which the effect of the LGB can be reduced;
- harvesting and storage of cassava. Farmers should be encouraged to only harvest cassava when they want to consume or market it, and not to attempt to store it dried.

6 Diversifying – production, marketing and processing of other crops

Why farmers should consider diversifying

- *It is no longer sure that maize will be profitable*
- *Other crops may be more profitable*

Calculating the cost of production of and returns from maize

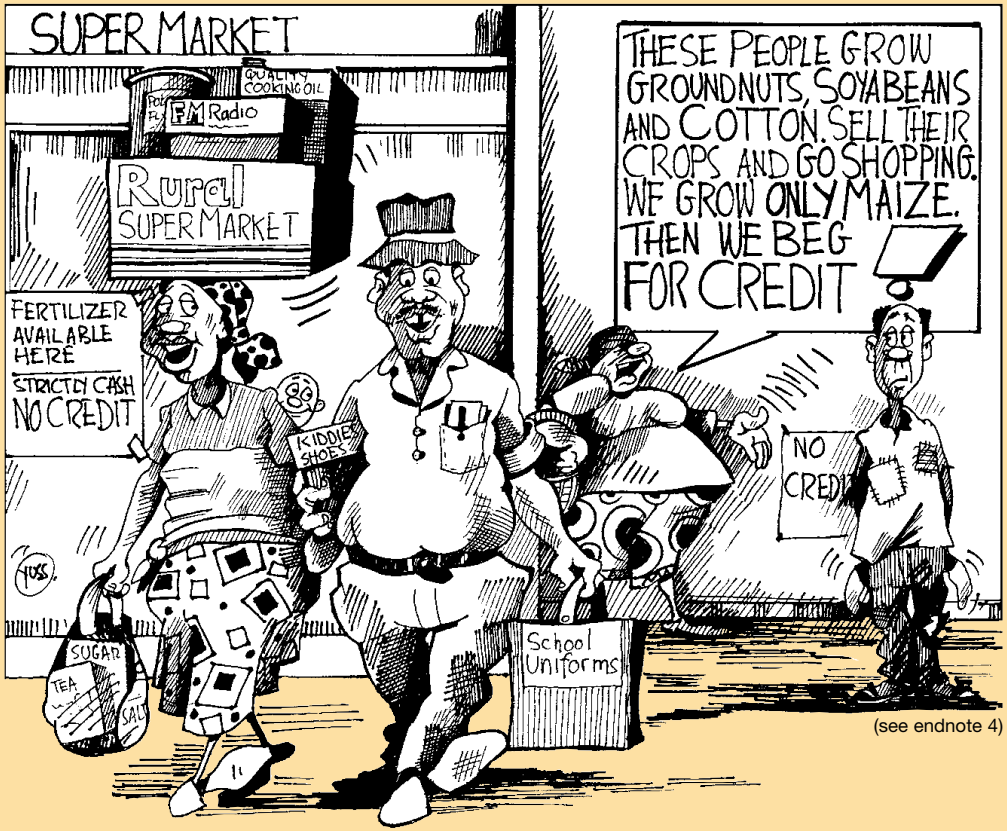
Calculating the cost of production of and returns from some other crops
(see also annex on page 111)

Many maize marketing issues are also relevant to other crops

Other crops that farmers could grow…

- *Paddy/rice*
- *Sorghum and millets*
- *Groundnuts*
- *Soya Beans*
- *Other oilseeds*
- *Cassava*
- *Cotton*

Farmers can no longer automatically assume they can make a profit from maize.



(see endnote 4)

An early decision to diversify out of maize could be beneficial.

FORMER MAIZE MARKETING CONDITIONS

Under state-controlled maize marketing all farmers could sell their maize to the marketing board or cooperative at the same price. Marketing board depots were established more or less everywhere. While some farmers obviously had greater costs to get their maize to the nearest depot than did others, these costs were not very significant. Under such a system farmers did not have to calculate whether maize growing was profitable. Unless they lived in an area which was really unsuitable for maize, they could assume that the government price would be enough to cover their production costs and give them a profit. As other crops were not subsidized by governments farmers, naturally, switched from them to growing maize, even though their land may have been more suitable for other crops. In recent years some governments have begun to reintroduce fertilizer subsidies, mainly targeted at maize. It is questionable how long they will be able to continue with such subsidies so farmers would be best advised to avoid "putting all their eggs in one basket" and not solely rely on maize.

THE NEED FOR DIVERSIFICATION

Farmers can no longer automatically assume that, providing the harvest is good, they will make a profit from growing maize. Those who farm in areas where marketing costs for maize are high may well find that the return does not justify the costs. Extension officers therefore have a role to help farmers calculate whether growing maize is profitable and to help them identify alternative crops that may be more profitable than maize. These crops may include other food crops such as sorghum, rice, millet or roots and tubers, traditional cash crops such as tobacco, cotton or groundnuts, oil seeds such as soya bean, horticultural produce for the local market or export[5] and, finally, newer crops such as flowers. In some locations livestock or poultry rearing may be an alternative to crop production.

While past policies in some countries encouraged the production of just one crop, maize, this was always a risky approach. Depending on just maize for income was not a good tactic for farmers, particularly in areas subject to drought. Depending solely on maize is even more risky when maize marketing is liberalized. Advice which extension workers should now be giving farmers therefore includes:

- grow more than just maize. Start diversifying with crops which used to be grown in the area before maize subsidies were introduced;
- consider intercropping maize with nitrogen-fixing crops such as beans, soya and groundnuts, thus both diversifying and reducing fertilizer demand;
- where the farmer is close to a city or town, consider possible markets for horticultural produce;
- where "outgrower" or contract farming schemes exist in the area, consider joining one;
- before planting something different make sure there are people willing to buy the new crop. Preferably, there should be several buyers to ensure competition between them. There will also have to be enough farmers growing the crop to ensure that there will be sufficient quantities to attract traders.

Farmers participating in an FAO Special Programme demonstration

Intercropping groundnut, cowpea and maize – Zambia

CALCULATING THE PRODUCTION COST

The annex shows a crop budget for maize. In order to help the farmer with this calculation the extension worker needs to find out the following:

- the cost of maize seed, fertilizer and agricultural chemicals, delivered at the farmgate;
- the cost of hiring oxen or, in some cases, mechanical power;
- labour costs and the number of days work required from planting to storage;
- the probable yield if the farmer follows recommended practices;
- the forecast price at which the farmer will be able to sell maize after the harvest.

Where farmers provide their own labour then that labour cannot be considered a cost *unless* they have alternative income-earning opportunities. If they have the chance of wage labour then they need to calculate whether they will earn more from growing maize or from working for cash.

Even if the calculation shows that maize will be very profitable for farmers, that does not mean that they should "put all their eggs in one basket" and just grow maize.

This approach of growing only maize has several problems:

- the price at which the maize can be sold can only be guessed at on the basis of information available before the farmer plants. If lots of other farmers think the price is going to be good after the next harvest and they all decide to plant maize then there may be a surplus and the price may collapse;
- there may be a drought and the yield may go down. Farmers may have only enough maize for their own family – and not even harvest enough for that. Growing all crops is risky but maize is particularly risky and farmers need to minimize that risk wherever possible;
- farmers cannot take advantage of crop rotation which is a sound farming practice and should generally be followed in preference to maize monoculture;
- other crops may be more profitable.

Farmers therefore need to consider growing other crops as well as, or even instead of, maize. The crops they can grow will depend on their farming environment and on their marketing possibilities. With information about probable yields for various crops, their input requirements and likely selling prices, the extension worker should be able to advise farmers of the best crop mix for their particular area. The budgets in the Annex give some idea of the calculations required, but

farm budgets more relevant to individual countries should be available from ministries of agriculture.

While diversification is highly recommended, the farmer does need to be sure that he can do the work. For example, it may not be a good idea to grow three crops which all need to be harvested at exactly the same time of the year, as the farmer may not be able to handle the workload. Farmers also have to consider cash flow – having to buy all inputs at the same time may also cause problems.

MARKETING AND PROCESSING OF CROPS OTHER THAN MAIZE

Many of the points made in connection with maize marketing are just as valid for other crops. However, there are specific marketing and processing arrangements for each crop and some of those will now be discussed.

The crops covered here are:

- paddy/rice;
- sorghum and millets;
- groundnuts;
- soyabean;
- other oilseeds;
- cassava;
- cotton.

Paddy/rice

Production of rice in Africa has been expanding in recent years. In a number of countries smallholders are growing paddy under irrigation. While a part of the crop is retained for domestic consumption, to be milled locally, farmers also usually sell part of the crop either as paddy or, after milling, as rice. Prices for rice are determined by two main factors: the *variety* (there are preferred local types) and the *quality* (determined by the milling method, that is percentage of brokens and the degree of cleanliness and freedom from stones, etc).

Farmers must be aware that there is a need to harvest their paddy in a timely manner (avoid shattering and broken grains) and to dry their paddy correctly (on a drying floor or mat, to avoid dirt and foreign matter) to facilitate milling.

If the paddy is to be sold as rice after the farmer has had it milled in a local mill, then the price received for

Figure 11
Calculating processing costs

Assume that a rice milling operation converts paddy at the rate of **70 percent** (0.7) and has saleable by-products equal to **25 percent** of the paddy weight. Processing costs per kilogram of paddy have been calculated at **$0.20 per kilogram** on the basis of the mill's total annual costs divided by the number of kilograms of paddy processed. The buying price of the paddy was **$1.50 per kilogram** and the by-products have a value of **$0.50 per kilogram**.

Then the processing cost per kilogram of paddy is…

One kilogram of paddy purchased	=	$1.50
Processing costs or **1 kg x $0.20**	=	0.20
Total Costs	=	$1.70
Less the by-product revenue of **1 kg x 0.25 x $0.50**	=	0.12
Break-even selling price per kilogram of paddy	=	$1.58

Thus the break even selling price per kilogram of milled rice is…

$1.58 ÷ **0.7**	=	$2.25

the rice will be determined by the factors mentioned. If the paddy has been husked but not polished, has a high percentage of broken grains and is "dirty" and perhaps of a variety which is not locally preferred (even if it is a high-yielding variety) then the prices received will be lower than other rice sold on the market. Farmers can add value to their paddy crop by storing it as paddy and subsequently selling it in a milled form if there is a good local demand for rice and if there are good milling facilities locally. However, if there are no local milling facilities or only husking machines are available, the farmer may be better off selling his crop as paddy to a local trader.

When paddy is turned into rice, the conversion rate is some 65-70 percent as the husk and the bran are removed. Farmers should, therefore, not directly compare local rice prices with the price they are receiving for their paddy as there is a loss of some one-third in the weight when paddy is turned into rice. Figure 11 shows a calculation of paddy processing costs[6].

As with other crops, the extension officer can assist farmers by helping them to work as groups to facilitate marketing, by organizing transport and by providing links with local traders and millers. Considerable care should be taken not to promote diversification into paddy production unless there are mills and/or traders active in the area.

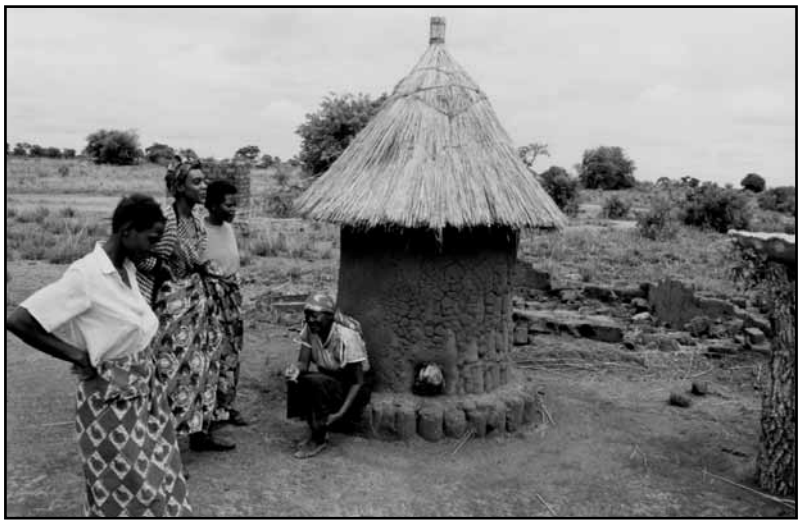
Sorghum and millets

These are more traditional crops than rice, commonly produced in the drier areas and mainly for local consumption. They can be useful crops to plant when lower-than-average rainfall is forecast. Attempts to commercialize sorghum and millet production have, however, often proved problematic. While research stations have come up with high-yielding varieties of sorghum, especially red varieties which are less attractive to birds, these tend to be bitter and are not acceptable to consumers. Moreover, marketing of sorghum has been beset by problems. In addition, attention needs to be paid to the variety that is grown, to ensure that it meets local tastes.

Commercial milling of sorghum and millet is not widespread, as the finished meal or flour is often more expensive than local maize. Milling is difficult and costly. These crops should be promoted mainly for subsistence and for local sale as grain unless there are identifiable marketing or milling outlets available.

In some countries, there is a demand for finger millet and some sorghum types for local brewing. This can be a remunerative but limited market. However, before these crops are promoted due attention must be given to the availability of local buyers.

Drying millet on a rack – Uganda



Groundnut store – Zambia

Groundnuts

There is a good potential for groundnuts for local consumption and for sale as confectionery nuts to groundnut shelling plants and also for sale to local oil mills. Good seeds of recommended varieties (confectionery or oil purposes) are required. Because of the danger of moulds in the nuts due to poor drying or to inappropriate washing to remove dirt, there is a significant danger of aflatoxins and this must be guarded against.

As with other crops farmers should only be encouraged to grow groundnuts when buyers are likely to be available. The scale of production to be promoted should be based on the availability of groundnut shelling plants, confectionery manufacturers and oil mills which can receive large quantities of nuts. Extension officers can facilitate supplies to larger buyers, especially oil mills, by grouping farmers so as to obtain transportable lots.

Soyabeans

Much has been written about the nutritional aspects of soyabeans. They are an important source of protein and contain calcium, iron and vitamins. However, this crop should only be promoted if a local demand and a local capability to utilize the soyabeans exists. Soyabeans can be used for oil production and the resulting cake is a valuable ingredient in animal feed and in various food products. However, the commercial viability of soyabeans rests on the availability of local factories/oil

mills to buy the beans. While there are some small-scale technologies for domestic oil extraction, their introduction should be in conjunction with support from home economists who can teach people how to process and subsequently use the soyabean products.

Other oilseeds

There are a number of other oilseed crops such as sesame (simsim) and sunflower which can be promoted as cash crops if there is a local oil-milling enterprise in the locality. In some countries sesame forms part of the local diet. In Uganda, the oil is used in cooking and the paste left over from the oil-making process is used as sauce. Variety is an important consideration for sunflower, with the black varieties having high yields and high oil content. In Northern Tanzania, a small-scale, sunflower oil press has been introduced. This enables home and village-level processing for domestic cooking oil requirements. It also has the advantage of significantly adding value to the sunflower crop.

There is a reasonable demand in export markets (and in local oil mills) for sesame but commercial exploitation of the crop should be based on the linkage of farmers with exporters and/or with local oil mills.

Cassava

This crop is a staple and drought-resistant crop in many countries and is often grown as a "security" crop. Where production is significant, for example in Western Africa, cassava is often sold to processing plants for chipping and export. However, most cassava is produced as a subsistence crop in Eastern Africa and commercial marketing is limited. Once harvested, the crop is very perishable and the low value-to-weight ratio makes cassava uneconomic for long-distance travel. Some varieties have a high arsenic content in their outer skins and require careful washing and peeling before cooking, especially if sold as a cooked product in local markets.

Cotton

Cotton, like maize, has undergone significant liberalization of marketing arrangements. Prior to the early 1990s, most cotton was purchased and ginned by marketing boards or cooperatives. While such an arrangement was not without its problems, notably the high costs of the government marketing agencies, it did have one benefit in that the buyers of the seed cotton were able to supply inputs to the farmers free of charge, secure in the knowledge that farmers had no alternative outlets for their cotton. The situation has now changed and an important consequence of liberalization has been that less inputs, in particular fertilizers and pesticides, are being used.

The cotton companies may be prepared to fund farmers' input purchases. Extension workers need to develop a climate of trust between farmers and buyers who provide credit because if the buyers think that farmers will not sell to them at harvest time they will not

be prepared to extend credit. Where such support for input purchase is not available, extension workers should be able to advise farmers where they can buy the right inputs. In Tanzania farmers had become used to using pesticides with particular brand names. With liberalization, agro-chemicals with different brand names but containing the same active ingredients went on sale. Farmers were reportedly suspicious of these and were reluctant to buy them. In such cases extension workers can play an important role in explaining to farmers that the newly available pesticides are basically the same as the ones they have been used to.

Transporting sacks of cotton – Uganda

7 Inputs, and paying for them

Impact of changes in input marketing arrangements

- *farmers need to identify retailers who have the most competitive prices*
- *farmers need to buy inputs on time*
- *farmers need to pay for their inputs and credit is less easily available now*

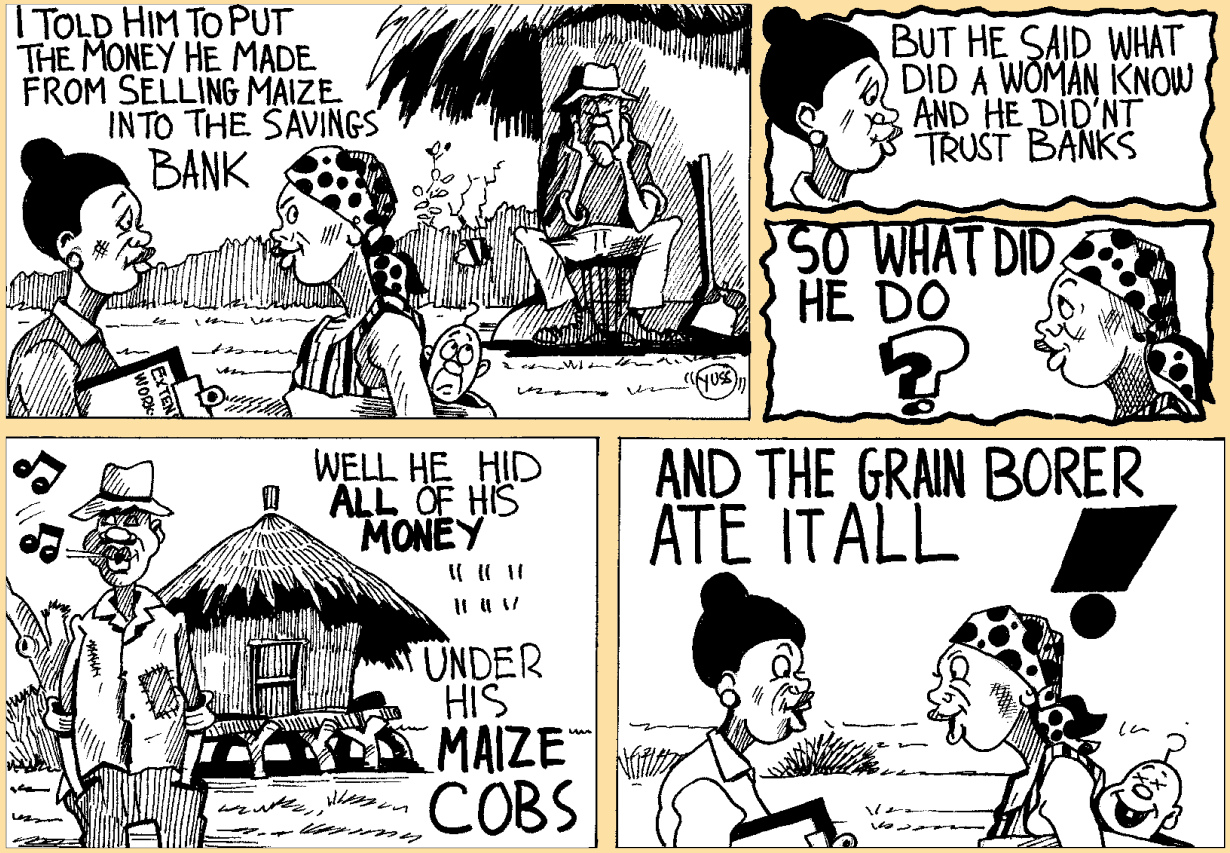
How extension workers can help farmers to

- *calculate their input needs*
- *identify where to buy inputs*
- *organize group transport*
- *obtain credit*
- *save*

When a family saves "in-kind" its wealth is visible and susceptible to theft…

…but if the family saves money in a bank neighbours and relatives are unaware of its assets.

Farmers are often reluctant to save.



Extension officers can emphasize the importance of saving…
…and the best way to save.

CHANGES IN INPUT MARKETING ARRANGEMENTS

For the purpose of this Guide we consider inputs as seed, fertilizer, storage chemicals and bags for grain. There are, of course, many other farm inputs, most notably labour, and mechanical and animal power.

Governments have in the past intervened heavily in the provision of credit to the agricultural sector. Credit often accompanied input packages offered by the marketing boards who, in turn, deducted the costs from the crop purchased after the harvest. Government and donor subsidies served to keep the cost of production and food prices low but encouraged levels of input use that were economically and environmentally unsustainable. With market liberalization, there was a move towards the reduction or abolition of subsidies with the transfer of distribution of agricultural inputs to the private sector (agribusinesses, fertilizer companies, agricultural traders and merchants). However, in some countries the government continues to intervene, thus hindering the development of the private sector in this capacity.

For most countries, the pattern that is gradually emerging is of private retailers, supplied by private distributors, becoming responsible for input sales.

The implications of this for farmers are:

- in the same way that they now try to identify crop buyers who offer the best price, they must also identify input retailers who have the least expensive products for sale;
- care must be taken to buy inputs before the retailers in the area run out of supply;
- agricultural credit arrangements have changed in many countries. Obtaining credit is usually more difficult and farmers may have to find alternative ways of paying for their inputs.

Inputs at a competitive price

It should not be assumed by farmers that, in a town with several input suppliers, the prices of the products they sell will always be the same. Thus, when shopping for inputs it is in the farmer's interest to contact all suppliers to obtain the best price. Reasons for price differences include:

- the product may be more or less the same, but the producer may be different. For example, there are several possible importers or manufacturers of urea in the Eastern and Southern African region. Their selling prices may all be different and this fact is reflected in their retailers' selling prices;
- the retailer may set prices on a "cost plus" basis, that is, by adding a percentage to the price paid for the fertilizer in order to arrive at a selling price. Thus the retailer's price may be related to the time of

delivery of the fertilizer, as manufacturers or wholesalers change their prices quite often;
- a retailer may set prices at a high level and still make sales. For example, a retailer with a store close to a bus station may be able to charge more than one further away. Or there may be a shortage of urea in the town, thus making it possible for the retailer to increase prices and still make sales.

Buying inputs while they are available

In several countries of the region there used to be massive fluctuations in the supply of inputs. In some years the local cooperative or marketing board experienced a shortage of fertilizer, while in others it had far more than farmers needed. As a private-market system of inputs distribution develops, it is possible that a more even supply of inputs will be achieved. The amount of fertilizer in shops will not depend on the efficiency of the marketing board or on how much foreign exchange the government can allocate for fertilizer but on how much retailers think they can sell. However, in some countries private sector suppliers are still cautious about the extent of their investment in agricultural inputs due to the fact that they are unsure to what extent the government will continue to interfere in input supply.

Fertilizer and other inputs are expensive and fertilizer retailers require a considerable amount of capital. The last thing they want is to tie up capital. If anything, they will be conservative in their estimate of likely sales, in order to avoid being left with stock which cannot be sold for another nine months. Thus, farmers who delay buying their fertilizer until the last minute, or experience difficulties in making credit arrangements, run the risk that all retailers in town will have run out.

Paying for inputs

In recent years the arrangements for obtaining credit have changed considerably. In many countries the situation has already arisen where banks are reluctant to lend to small-scale farmers, who are seen as a high-risk category. This does not mean that farmers have no options for funding their input purchases. Firstly, self-finance should not be overlooked and farmers should be encouraged to build up their savings. Further, alternative options are beginning to emerge to cater for the financial needs of small-scale farmers including:

- *outgrower or contract farming schemes*: These are for the most part run by private sector agribusiness companies that provide finance to the farming sector, predominately to the small and medium-scale farmers, but in some cases also to commercial farmers. They can exist in a variety of forms, often providing production credit in the form of inputs and a pre-planting guaranteed price for the crop. The advanced credit is deducted from crop sales at harvest time. The package offered by outgrower schemes usually consists of: timely input supply, training in crop management (where the extension

worker can play an important role) and crop marketing. Through outgrower schemes, small-scale farmers are indirectly accessing credit from formal financial institutions who are financing the agribusiness. Such schemes work best with cash crops such as cotton and tobacco and there are few examples to date of successful schemes with staple food crops;

- *barter arrangements with input suppliers*. Farmers can exchange their maize (or other acceptable crops) for required inputs. No cash changes hands but generally the exchange of produce must take place prior to the release of inputs;
- *agricultural traders and agribusinesses*. In addition to formal outgrower schemes, some agricultural traders provide credit directly to small-scale producers;
- *farmer associations*. These can assist in the supply of inputs and credit to individual association members, and can market produce through a collective marketing mechanism;
- *saving the surplus cash* at harvest time to purchase inputs for the following season.

Extension workers could provide assistance to individual farmers and groups by establishing links with formal and semi-formal financial institutions and by providing a list of input suppliers in the area who operate credit schemes, outgrower schemes, or barter arrangements.

HELPING FARMERS WITH INPUT SUPPLY AND FINANCE

In the same way that extension workers can do much to assist farmers to market their maize, there is considerable scope for them to help farmers to obtain necessary inputs. These activities include helping farmers to:

- calculate their input needs;
- identify where to buy their inputs;
- organize group transport;
- obtain credit;
- save.

Calculating input requirements

In many countries farmers used to adopt a fairly irresponsible approach to credit repayment, viewing credit as a grant or hand-out from the government and repayment rates were often very low. The fact that there was often no real obligation (apart from a moral one) to repay loans meant that farmers often did not worry too much about whether applying fertilizer would be cost-effective or not.

Times have now changed and easy credit is no longer available. At the same time, it is now more difficult to calculate the economic viability of fertilizer application.

In the past, if the marketing board announced the price for maize in advance then the farmer could have a reasonable idea of likely returns from using fertilizer. In fact, the government maize price was often calculated on the basis of the cost of production using fertilizer. Now, the price is not known. If the overall harvest is good, then the price will be low and may not justify the application of fertilizer. If the overall harvest is bad then the price will be high and will certainly have justified fertilizer application if the farmer achieves a normal harvest. But, at times of drought, there may be a very small crop, with no surplus beyond a family's needs.

Ministries of agriculture in the region need to consider revising recommended application rates for fertilizer to reflect changes in marketing and pricing arrangements for both inputs and outputs. Past "blanket" recommendations for a whole country need to be made more specific to certain areas and soil types, and to reflect relative risks of crop failure. Extension workers should be able to advise farmers of the probable yield increases resulting from fertilizer application, and help them calculate the likely returns, assuming different selling prices for their maize.

A widely used measure of profitability of using fertilizer has been the Value-Cost Ratio (VCR). This is defined as the sales value of the extra yield produced by using fertilizer divided by the cost of that fertilizer. Normally, a VCR of *at least two* is considered necessary, although a VCR of this level is risky if there is a danger of drought, disease or crop prices falling. Figure 12 illustrates how the VCR can change as crop prices rise. When the maize price was fixed by the government, calculating the VCR was relatively easy. However, these days it is almost impossible to do as, at planting time, the farmer is faced with having no information with which to forecast the likely price. The situation is not quite as difficult when top dressing application is required because, by then, the rainfall pattern should be clearer and a rough guess can be made as to whether the harvest is likely to be good or not. In helping farmers estimate the VCR, the extension officer should make sure that the *value* used for maize and the *cost* used for fertilizer is the *actual* price at the farm gate. That is, transport and other costs need to be deducted from the grain price and added to the fertilizer price.

Ways in which extension workers can assist farmers in making decisions about input use include:

- providing information about grain market prices over past years, and adjusting these for inflation;
- advising farmers of any available weather forecasts. In particular, if weather patterns are heavily influenced by the *El Niño* effect there may be a possibility of drought.

Where to buy inputs?
Chapter 3 suggested that provincial extension services should consider preparing lists of maize buyers and their prices. At appropriate times of the year such lists should also include information about fertilizer, seed, agrochemical and bag suppliers and their prices. Extension workers should confirm these prices by phone before farmers visit towns to buy inputs. Information could also be made available about whether traders are able to extend credit or whether they are prepared to exchange maize for inputs.

Group transport of inputs
While traders are often prepared to visit villages to buy maize and other crops, input dealers are, at present, rarely prepared to deliver inputs. This situation may change in the future as private input retailers become more financially viable and more confident about the business they are in but, in the short run, farmers will have to continue to organize their own transport.

Farmers who organize themselves in groups or associations can combine their resources and purchase their inputs in bulk, whether seed, fertilizer or pesticides, so reducing transport costs and ensuring timely delivery of inputs.

This system used to be widely practised in Zimbabwe, where village groups pooled together to collect fertilizer from one of the two fertilizer factories in Harare. It is an approach which could be adopted by farmers elsewhere in the region and would be more efficient than individual farmers buying a few bags and transporting them home on the roof of a bus. It may also be possible to obtain quantity discounts from retailers, who would clearly prefer to sell a pick-up full or a truckload at one time, rather than have to deal with numerous small farmers each wanting one or two bags. Organizing group transport is, however, not so easy and this is where the extension worker can play an important role by contacting the transport companies, identifying and negotiating with the retailers and ensuring that the groups of farmers are properly organized.

Helping farmers to obtain credit
Whether trying to acquire a loan or make a deposit in a formal or semi-formal financial institution will require transport, time and in many cases repeated visits. The extension agent, should not become involved in "actual" banking practices related to savings or credit but can provide assistance to farmers in the district, as follows:

- by providing lists of financial institutions, private companies, outgrower schemes, and agribusinesses who are engaged in providing credit to small-scale farmers, specifying…

    - *name, address, and telephone number;*

- *if there is a mobile bank service to the villages (day, time etc.);*
- *loan terms and conditions, that is interest rates, loan duration and repayment schedule;*

- by estimating costs of production (see Chapter 6 and the Annex), and how much can be financed from the farmer's own funds and how much external credit will be required to purchase inputs;
- by organizing group transport to the urban centres. In the majority of cases repeated visits to a financial institution are necessary before a loan is given out. With careful planning, farmers can, however, conduct their financial business in conjunction with the sale of produce, so reducing costs;
- by completing application forms for farmers (loans and savings accounts), which can be a detailed and cumbersome process, especially for clients who are largely illiterate.

Helping farmers to save

Accumulating savings prior to requesting a loan is a valuable educational mechanism to help smallholders appreciate the value of money. Saving even small amounts on a regular basis instils a disciplinary effect on the saver. The idea that small-scale farmers have a poor saving capacity, and consequently a poor demand for savings deposit facilities, is untrue. Farm households can and do save and if they have access to appropriate savings instruments and stable financial institutions (where savings can be considered "safe") they ought to be encouraged to save in monetary terms rather than in-kind.

It is widely recognized that access to savings deposits and money transfer services is just as vital as access to loans. In any given community, there are likely to be four or five times as many savers as there are borrowers. Access, security, maintenance of value and investment return are all important for the depositor. However, there is often a lack of appreciation among small farm households of the potential of local savings to fund investments. Encouraging small farmers to save will foster investment in rural areas. Extension agents also need to emphasize the importance of using savings to purchase inputs for the following season.

When small-scale farmers save their primary concern is that of safety. An important question which an extension worker must try to answer is whether the local financial institutions are safe. If such an institution collapses, it will result in a long-lasting mistrust towards the idea of saving.

When a farmer saves "in-kind", whether in livestock, grain or other farm products, his "wealth" is visible to the community and, in addition, more susceptible to theft and damage. Financial savings, when safe, eliminate the risk of loss and neighbours, relatives and friends are unaware of the farmer's assets and therefore less demanding.

Ways in which the extension agent can assist farmers to save include:

- emphasize the importance of savings;
- provide advice on available financial institutions…
  - *stability of institution and safety of deposits;*
  - *types of savings account offered;*
  - *minimum amount required as an initial deposit;*
  - *interest rate;*
  - *access to savings (for example a demand deposit is payable on demand and requires no prior notice of withdrawal, generally such deposits earn a low rate of interest. Term deposits are payable after a predetermined period of time and generally earn higher rates of interest);*

- advise individual farmers and groups on savings accounts that best suit their situation, considering production costs, production patterns and household needs.

Endnotes

1. Reproduced by the kind permission of the “Zambian Farmer”.

2. For a more detailed discussion of marketing costs, see *A guide to marketing costs and how to calculate them* by Andrew W. Shepherd, AGS, FAO, Rome, 1993 (updated 2007).

3. The material in this chapter owes much to *Maize marketing costs and margins*, No. 4 in a series of Market Liberalization Impact Studies, Ministry of Agriculture, Lusaka, 1995.

4. Based on a cartoon which first appeared in the “Zambian Farmer”.

5. See Horticultural marketing. *Marketing Extension Guide No. 5*, FAO, Rome, 2005.

6. See also endnote 2 above.

Annex – crop budgets*

Maize
Cotton
Sorgum
Sunflower
Groundnut

Crop budget 1
Small-farmer maize production

YIELD (t/ha)	1.2	3.5	4.5
Labour days (per ha)	112	127	140
Variable costs (per ha) – Prior to harvesting			
1. Seed (kg)	25	25	25
2. Fertilizer costs (at farm gate)			
a. Amm. Sulphate (bags)		5	5
b. TSP (bags)			2
3. Insecticide			
a. Cymbush (lit)			
b. Thiodan (kg)			
4. Miscellaneous	2%	2%	2%
Subtotal			
Variable costs (per ha) – Harvesting and marketing			
1. Packing materials			
a. Bags			
b. Twine (kg/ton)			
2. Transport (off farm)			
3. Miscellaneous	2%	2%	2%
Subtotal			
Total			

Source: Marketing Development Bureau – Tanzania

* Yield and input usage figures are for example only. Extension workers should base calculation on recommended economic rates of input use for their particular locations.

Crop budget 2

Small-farmer cotton production (unginned)

YIELD (kg/ha)	500	1000	1500
Labour days (per ha)	105	134	162
Variable costs (per ha) – Prior to harvesting			
1. Seed (kg)	25	25	25
2. Fertilizer costs (at farm gate)			
a. NPK (bags)	4	5	5
b. Amm. Nitrate (bags)	2	3	4
c. Lime (bags)	8	8	8
3. Insecticide			
a. Carbaryl 85WP (kg)	2.5	2.5	2.5
b. Endosulfn 35MO (lit)	2.5	2.5	2.5
c. Synth. Pyrethtroid (lit)	1.0	1.0	1.0
d. Dimethoale 40EC (lit)	0.5	0.5	0.5
e. Triazophas 40EC (lit)	0.7	0.7	0.7
f. Molasses (lit)	30	30	30
4. Miscellaneous	2%	2%	2%
Subtotal			
Variable costs (per ha) – Harvesting and marketing			
1. Packing materials			
a. Bags			
b. Twine (kg/ton)	0.13	0.13	0.13
2. Transport (off farm)			
3. Miscellaneous	2%	2%	2%
Subtotal			
Total			

Source: AGRITEX – Zimbabwe

Crop budget 3

Small-farmer sorghum production

YIELD (t/ha)	1	2	3
Labour days (per ha)	100	105	116
Variable costs (per ha) – Prior to harvesting			
1. Seed (kg)	15	15	15
2. Fertilizer costs (at farm gate)			
a. NPK (bags)	3	4	5
b. Amm. Nitrate (bags)	1	2	3
3. Insecticide			
a. Dimethoate (lit)	0.9	0.9	0.9
b. Dipterex (kg)	4.0	4.0	4.0
4. Miscellaneous	2%	2%	2%
Subtotal			
Variable costs (per ha) – Harvesting and marketing			
1. Packing materials			
a. Bags			
b. Twine (kg/ton)	0.2	0.2	0.2
2. Transport (off farm)			
3. Miscellaneous	2%	2%	2%
Subtotal			
Total			

Source: AGRITEX – Zimbabwe

Crop budget 4

Small-farmer sunflower production

YIELD (t/ha)	0.5	1	1.5	2
Labour days (per ha)	434	434	434	434
Variable costs (per ha) – Prior to harvesting				
1. Seed (kg)	10	10	10	10
2. Fertilizer costs (at farm gate)				
a. Compound (bags)				
b. Amm. Nitrate (bags)		1	2	3
3. Insecticide				
Endouslfan 50WP (kg)	2	2	2	2
Molasses (lit)	2	2	2	2
4. Miscellaneous	2%	2%	2%	2%
Subtotal				
Variable costs (per ha) – Harvesting and marketing				
1. Packing materials				
a. Bags				
b. Twine (kg/ton)	0.2	0.2	0.2	0.2
2. Transport (of ffarm)				
3. Miscellaneous	2%	2%	2%	2%
Subtotal				
Total				

Source: AGRITEX – Zimbabwe

Crop budget 5

Small-farmer groundnut production

YIELD (t/ha)	0.5	1	1.5	2
Labour days (per ha)	76	83	90	97
Variable costs (per ha) – Prior to harvesting				
1. Seed				
a. Purchased (kg)	25	25	25	25
b. Homegrown (kg)	75	75	75	75
2. Fertilizer costs (at farm gate)				
a. SSP (bags)				
b. Gypsum (bags)				
c. Transport of Fertilizer				
3. Insecticide				
a. Dimethoate (lit)	0.9	0.9	0.9	0.9
4. Seed Treatment				
a. Innoculant (units)	2	2	2	2
b. Thiram 80WP (kg)	0.1	0.1	0.1	0.1
5. Miscellaneous	2%	2%	2%	2%
Subtotal				
Variable costs (per ha) – Harvesting and marketing				
1. Packing materials				
a. Bags				
b. Twine (kg/ton)	0.2	0.2	0.2	0.2
2. Transport (off farm)				
3. Miscellaneous	2%	2%	2%	2%
Subtotal				
Total				

Source: AGRITEX – Zimbabwe

NOTES

The following is a list of booklets published in the MARKETING EXTENSION GUIDE series:

A guide to MARKETING COSTS
and how to calculate them
1993 (revised 2007), 59 pp. (E F S R)

A guide to MAIZE MARKETING
for extension officers
1999 (revised 2010), 115 pp. (E F)

Understanding and using
MARKET INFORMATION
2000, 85 pp. (E F S R)

MARKET RESEARCH
for agroprocesssors
2003, 114 pp. (E S R)

Planning and designing
RURAL MARKETS
2003, 120 pp. (E S)

HORTICULTURAL MARKETING
2005, 131 pp. (E F S)

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R — Russian

Series editor: Andrew W. Shepherd

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related to agricultural marketing
please contact:

Market Linkages and Value Chains Groups
Rural Infrastructure and Agro-Industries Division (AGS)

Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome, Italy

FAX: (+39-06) 57053057
E-mail: AG-Registry@fao.org

This Guide has been designed to be used by extension officers in the course of their work with small farmers in those countries of Eastern and Southern Africa that liberalized their maize marketing systems in the 1990s. As a result of the move away from marketing by grain boards, extension officers had to develop new skills. They need to advise farmers on what crops to grow, on how and where to sell their crops and on how to store their crops. They also need to answer farmers' questions about prices, about whether to store their crops or sell them immediately and about where to buy inputs such as fertilizer and seed and how to pay for them. Extension workers can play an important role in ensuring that marketing systems work to the benefit of both farmers and consumers and promote food security. As it covers the basic principles of private-sector grain marketing, as well as on-farm crop drying and storage, this Guide should also be valuable for extension workers elsewhere in Africa.