Value Chains & Trade

STRUCTURED GRAIN TRADING SYSTEMS IN AFRICA

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IN MEMORIAM

As this manual was going to press, we were saddened to learn of the untimely death of one of the authors, Stephen Kiuri Njukia.

Working most recently with AGRA, Stephen was a tireless advocate for enterprise development in Africa. He had worked closely with CTA on value chain topics and was also instrumental in the establishment of EAGC. He will be greatly missed by all those who had the pleasure of knowing and working with him.

The Technical Centre for Agricultural and Rural Cooperation (CTA) is a joint international institution of the African, Caribbean and Pacific (ACP) Group of States and the European Union (EU). Its mission is to advance food and nutritional security, increase prosperity and encourage sound natural resource management in ACP countries. It provides access to information and knowledge, facilitates policy dialogue and strengthens the capacity of agricultural and rural development institutions and communities. CTA operates under the framework of the Cotonou Agreement and is funded by the EU.

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The Eastern Africa Grain Council (EAGC) is a membership-based organization registered in Kenya as a Company limited by Guarantee and without share capital. It was registered in 2006 at the request, and through the efforts of, key stakeholders in all three sections of the grain value chain; producers, traders and processors. Service providers are Associate members. It operates as a non-profit, non-political, non-denominational organization, which prepares, disseminates, and promotes the exchange of information on matters affecting the regional grain industry.

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Contents

FOREWORD

As more of Africa's smallholder famers become active players in value chains, one needs to develop the institutions that enable farmers, traders, warehouse managers and processors to produce, trade and market products efficiently and cost-effectively. Sophisticated trading systems already exist for export commodities such as coffee and cut flowers. But for staple commodities , such systems are still in their infancy in most African countries.

Hence the need for this manual. It describes how structured trading systems work for grains such as maize, sorghum and millet, as well as commodities such as groundnuts and soybeans, Africa's most important staples. Structured trading is a way of organising, regulating and financing trade in a commodity. The grain is graded according to a set of agreed standards, and it is stored safely in a trusted warehouse. These two things make it possible for the owner to use the grain as collateral for a loan before it is sold. Moreover, the grain can be sold without having to move it out of the warehouse. And it can be traded on a commodity exchange, where buyers and sellers can agree on a deal without having to physically inspect the grain.

This has huge advantages for everyone involved. Farmers have a more assured market, and can sell the grain when the price is right. For traders, buying and selling is easier, less risky, and more efficient. Buyers have a more reliable supply, assured quality, and a broader range of potential suppliers. Costs and wastage are lower; income for everyone involved can be higher.

To succeed, structured grain trading needs a conducive policy environment that levels the playing field and allows the market forces of supply and demand to support a transparent process of price determination. That means halting bans on exports and imports, and avoiding interventions in prices, procurement and distribution. By explaining how structured trade works in a clear manner, this manual should help those involved in setting policies to avoid unpredictable interventions that disrupt the smooth and efficient working of markets. It will also support them to put in place a policy framework that is conducive to developing the institutions needed for structured trade.

Structured trading is how most grain is traded in the developed world, and is now expanding in Africa. This manual explains how the system works, from postharvest handling and warehousing to trading on a commodity exchange. It describes the mysteries of standards, explains how market information is used, and explores the details of trade contracts and dispute resolution.

The manual was developed through a participatory "writeshop" in July 2012 in Arusha, Tanzania. The 17 contributors, all specialists in various aspects of grain handling and structured trading in Africa and elsewhere, presented and discussed manuscripts on each aspect of this complex subject. The editors then helped small teams of contributors to revise the manuscripts into the various chapters. After the writeshop, the draft was further refined to ensure it reflects recommended practices and needs.

The manual is an output of CTA's new "Value Chains" programme, which is designed to support the development of more efficient chains for priority commodities in African, Caribbean and Pacific regions. It should be a valuable guide for all those involved in creating and running the elements that make up structured trading systems, such as managers of farmers' associations, warehouse operators, grain traders, banks, market information services, students and educators, as well as the policymakers who aim to modernise grain trading in Africa. It will also form an important component of courses offered by EAGC's Eastern Africa Grain Institute.

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1 Introduction

to structured trading systems

Agricultural commodity markets

You are a grain trader in an African country. A milling company calls: it wants to buy 200 tons of Grade 1 maize to turn into flour to sell in the capital city. The company needs the grain next week.

You put the phone down. It's a good business opportunity, you think. But first you have to find the grain.

And that's where your problems begin. How can you find 200 tons of maize so quickly? Farmers tend to store their grain at home, rather than in commercial warehouses. The quality of their grain is dodgy. Sometimes it has not been dried properly, so can get mouldy. Some bags contain a lot of sticks and stones – bad news for the miller's equipment. And if you manage to find enough grain of the right quality, you will need to arrange transport to deliver it to the mill.

And what price should you pay? You know the price has been going up and down over the last few weeks, so you are unsure of the current price. Where can you get the money to finance the purchase? And the government keeps on changing the rules: has the tax it announced last week come into force yet? Will there be checkpoints along the road that can delay transport and add costs?

* * *

Such problems are called **transaction costs**: they raise the cost of buying and selling grain and other commodities.

It is problems like these that hamper agricultural development and economic growth in much of Africa. They affect everyone in the chain (Figure 1).

Farmers, traders, transporters, processors, wholesalers, retailers and, ultimately, consumers all suffer. It is as if there is a brake on the arrows in Figure 1. High costs at each stage in the chain mean lower profits for everyone, so less of the product flows along the chain, and the product that reaches the consumer is more expensive than it should be.

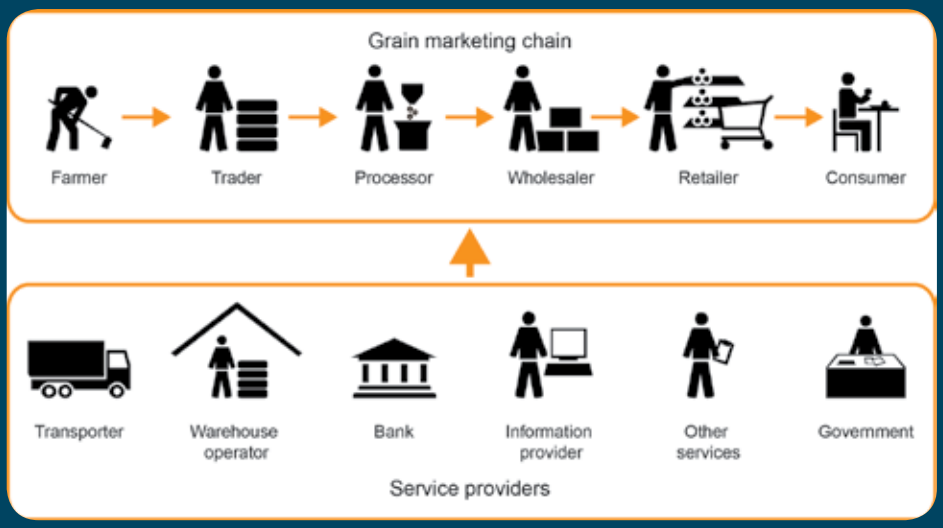


Figure 1. A grain marketing chain links everyone involved in producing a product and selling it, from the farmer to the consumer. The chain is supported by various other actors, including transporters, banks, other service providers (such as information providers and insurers), and the government.

Here are some of the problems that affect farmers and traders early in the chain:

- Poor postharvest handling and management, leading to big losses and poor quality of grain
- Pressure for farmers to sell to meet urgent financial needs
- The need for traders to source grain from a large number of scattered farmers
- Big seasonal variations in the availability of grain, leading to wild changes in the price
- Lack of up-to-date, accurate information on prices and standards
- Lack of suitable storage facilities
- Poorly developed financial mechanisms, making it hard to get loans
- Unpredictable government policies.

Solve these problems, and agricultural commodity markets have huge potential for spurring economic development and ensuring food security. Trade in grain, as well as commodities such as coffee, is the mainstay of most

rural economies in Africa, and contributes significantly to national, regional and international trade. A well-organized trading system enables food to be moved from place to place, so ensuring people do not go hungry. It ensures that the food complies with standards for quality and food safety. It saves money and reduces risks for everyone in the chain. It absorbs the surpluses that occur at harvest time, and evens out spikes and slumps in prices. And it makes it possible for farmers to get loans, which they can invest in their farms, so spurring production and boosting their income. That is good for farmers and other rural people, good for national food security, and good for the economy as a whole.

This book is about how to organize such a commodity market. It focuses on the structured trading system for one group of commodities – grains such as maize, sorghum and millet, as well as pulses such as soybeans. It looks at the components of such a system, and how it could work in Africa.

Structural adjustment and market liberalization

Until the early 1990s, the grain trade in many African countries was controlled by the government. Most development efforts in food crops focused on helping smallholder farmers increase their productivity to meet the growing demand for food. Governments intervened in the market, controlling distribution and the price of grains. That left farmers with few marketing decisions to make: they did not have to worry about where to sell as the government would always buy most of their surplus. At the same time, there were few incentives for the private sector to trade large volumes of grain. Often its activities were technically illegal. That limited the development of commodity trading, in which prices and distribution depend on supply and demand. Indeed, government involvement often led to gluts at harvest time due to the provision of subsidized inputs and cheap credit. Marketing-board buying prices were often either too high or too low. Shortages and long queues for consumers to get basic supplies were a result.

In the mid-1990s, structural adjustment programmes led to market liberalization throughout Africa. Farmers were left on their own to make business decisions. But they knew little about how to manage their farms as an enterprise. Today many farmers, especially smallholders, still struggle to market their output.

Structured trading systems

Governments, development agencies and the private sector in Africa are trying to deal with this problem. They are promoting the creation of dependable marketplaces where producers and consumers can meet

and exchange their grain, as well as other goods and services. That means establishing structured trading systems involving improved warehouses, warehouse receipts and commodity exchanges. It also means setting up the rules that buyers and sellers follow – rules that are enshrined in trade contracts and require a clear agreement on quality grades.

A structured trading system is one where farmers, traders, processors, millers, banks and others enter organized, regulated trading and financing arrangements. Such systems are not new in Africa: they are used for export commodities such as coffee. But they are still not common for staple grains.

Some structured trading systems are simple; others are more sophisticated. But all have the same core components:

- Good postharvest management (Chapter 2)
- Reliable commercial storage and warehousing (Chapter 4)
- Efficient trade financing through warehouse receipt systems or collateral management (Chapter 6)
- Effective commodity exchanges (Chapter 7).

Such systems also rely on several cross-cutting elements:

- Grades and standards (Chapter 3)
- Market information (Chapter 5)
- Contracts (Chapter 8).

How structured trading works

Structured trading starts with good postharvest management. That means making sure that the grain is harvested properly, threshed (or dehusked and shelled), dried to the recommended moisture level, sorted and cleaned to remove all foreign matter. It is then usually put into bags, though there are moves to increase the amount of bulk handling.

The bags are then taken to a certified warehouse where the crop is graded accordingly to specific quality and safety standards. The depositor (the farmer or trader) is given a warehouse receipt stating how much grain of what type he or she has deposited in the warehouse. The warehouse operator guarantees the safety, quality and quantity of the grain and is legally bound to provide it to the depositor in the future.

The depositor can then take the warehouse receipt to a bank or other financial institution and use it as collateral for a short-term loan. By doing this a farmer can get money to pay expenses, and can buy inputs for the next

season. A trader can get money to buy more of the crop from farmers. The grain stays in the warehouse until the depositor wants to sell it, hopefully because market prices have risen. The depositor uses a market information system to check on the prices, and when they are right, he or she decides to sell. The grain may be sold on the open spot market or through a commodity exchange.

When the grain is sold, the warehouse delivers the grain to the buyer. If applicable, the bank is repaid the loan plus interest, and the warehouse operator is paid for the costs of storage. Even after these deductions, the depositor should normally get a better price than if he or she had sold the grain immediately at harvest time.

This system ensures that the commodity being traded is of known quality. For the warehouse to accept it, it must be graded against agreed standards. That makes trade easy: both sellers and buyers know about the quality, quantity and location of the grain. The buyer does not have to inspect the grain before buying it, reducing his or her costs. The transaction is formalized through a trade contract which clearly spells out the terms and conditions of the sale and the obligations of both parties. If they disagree, a dispute-resolution mechanism can resolve the problem without their having to go into long litigation.

Advantages of structured trading

Structured trading is an orderly, organized, trading process where all the players understand the rules and stick to them. It provides transparency, improves efficiency, and reduces transaction costs for all actors in the chain.

Structured trading reduces the risk and costs of all those in the chain:

- **Farmers** want access to a market that will give them the best prices at least cost. Structured trading helps them by giving them control over when they sell their output. That means they can sell when the price is right, rather than immediately after harvest when it is usually lowest. That evens out fluctuations in supplies and prices. It also makes it possible for farmers to get loans using their grain as collateral and for them to obtain higher prices as a result of being able to store their grain in good-quality warehouses.

- **Traders** want to buy at a low price and sell at a high price. But, more importantly, they also want a reliable supply of grain of the right quality that they can sell to their clients. Structured trading helps them do this by ensuring that the grain conforms to certain standards and is available in

large quantities in convenient locations. When traders deposit grain in a warehouse, they can use it as collateral for loans to buy more.

- **Processors** want a continuous and reliable supply of raw materials of the right quality and at low cost. Structured trading helps ensure this through its system of grades and standards, and because trade is channelled through reliable warehouses and suppliers that ensure grain quality is maintained, rather than through a haphazard network.

- **Consumers**, at the apex of the chain, want safe and nutritious food of good quality at affordable prices. Structured trading enables them to get this because it ensures quality but reduces costs along the value chain.

Once a structured trading system is properly developed, it is much easier to use than a traditional trading system. A warehouse receipt makes it easy to buy and sell grain. Instead of moving around lots of grain, the depositor can just sell the warehouse receipt. The grain stays where it is, safely stored, while its ownership changes. Everyone gets more assurance: that the grain exists, it is stored safely, it will actually be delivered, and payments will be made.

BOX 1. BOOSTING PRODUCTION NEXT SEASON: HOW A WAREHOUSE RECEIPT SYSTEM HELPS

In February 2011, the Witima Chicofar Farmer Group in Kenya deposited 173 bags of maize at Lesiolo Grain Handlers, a warehouse operator that runs a certified warehouse receipt system. The grain had a market value of KSh 398,000.

The farmer group presented their warehouse receipt to Equity Bank in Nakuru, and used it as collateral for a loan of KSh 265,000. They used this money to buy seed, fertilizers and other inputs for the next planting season. Getting sufficient inputs on time enabled them to plant on time, which boosted their next season's yield.

The group watched the price of maize. In June 2011, they sold their grain for KSh 570,000. The transport, warehousing and financing cost totalled KSh 40,000. This enabled the group to make a margin of KSh 132,000 – an amount they would have missed had they sold in February.

BOX 2. WHY PRICES GO DOWN AT HARVEST TIME

In most places, what crops you can grow depends on the season. So farmers plant maize and other grains at the start of the rainy season, and harvest them in the following dry season. They all want to sell some of their crop soon after harvest so they can pay their bills and buy seed and other inputs for the next season.

Lots of grain on the market means that prices generally fall. Wait a few months, though, until everyone has sold their grain, and the price usually (but not always!) starts to go up again. The price is generally highest just before the next harvest, when stocks are lowest.

Structured trading evens out these fluctuations by enabling farmers and traders to store grain, to raise finance on that stored grain, and to buy and sell when prices are higher.

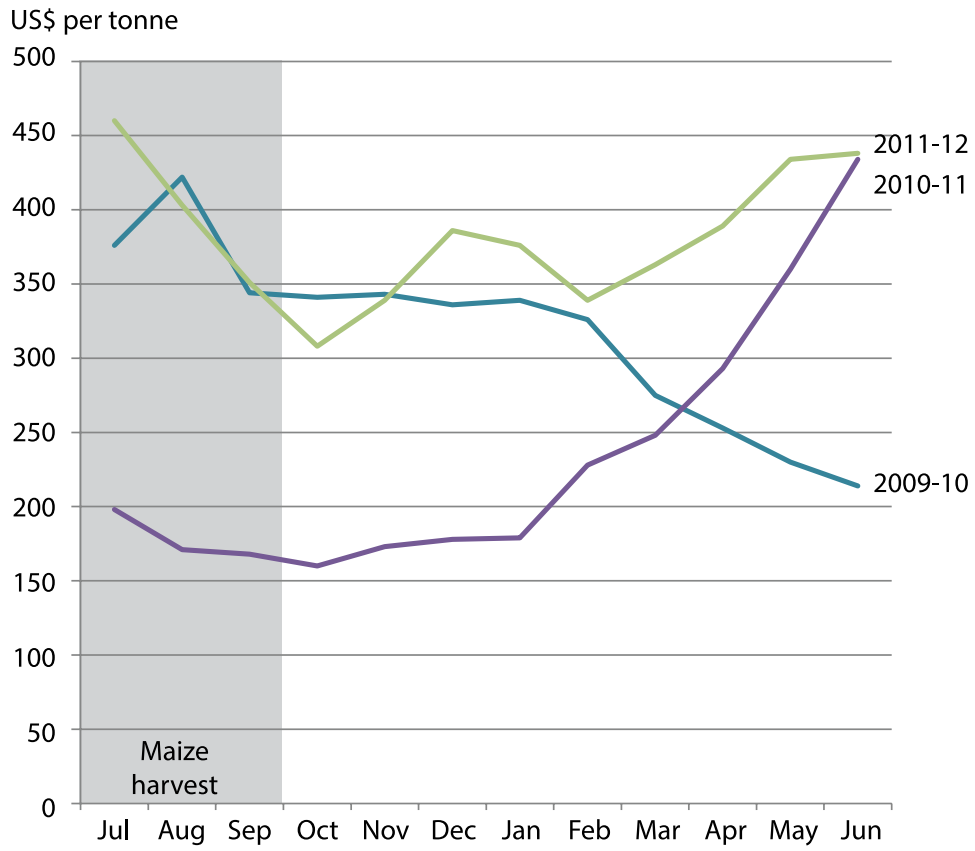
Note: many other things can affect the price of maize, including imports of grain from elsewhere. So the pattern may vary from year to year. In the illustration below, using prices from Kenya, farmers and traders who had stored grain in 2010-11 and 2011-12 would have made money. However, that would not have been the case in 2009-10, when there was a record harvest.

What does a structured trading system need?

Various things are needed for a structured trading system to work:

A suitable business, policy and regulatory environment that supports trade and removes political interference in the market. This permits transparency and free market operations under contractual arrangements between a willing buyer and a willing seller. Political interference and its impact on structured trade may include:

- **Export and import bans and changes in export or import tariffs.** These can seriously disrupt trade and affect domestic prices. A ban on exports (or an increase in export tariffs) may push the local price of grain down. People who have stored grain in the expectation of a price rise may lose out. Similarly, an import ban (or higher import tariffs) is likely to push prices up. This may encourage some grain owners to not honour their contracts as they can get higher prices elsewhere.



Data Source: Eastern Africa Grain Council, Regional Agricultural Trade Intelligence Network

Figure 2. Maize prices in Nakuru, Kenya, 2009-2012

- **Price controls and price setting.** Arbitrary price-setting by governments rarely, if ever, works. Nor does the establishment of minimum or maximum prices. They can lead to gluts, shortages and corruption. Markets and commodity exchanges function on the basis of a realistic assessment of likely future prices by those people doing the trading. They cannot function in an environment where, say, Ms A has a contract to sell to Ms B at $400 a ton, only for the government to impose a maximum selling price of $350 a ton. They also cannot function when the government instructs a marketing board or food agency to buy grain at a very high price. In that case the private sector will not be able to compete, companies will go bankrupt, and no one will want to use the commodity exchange.

Secure storage facilities. Professionally managed, secure warehouses are central to the system. This is what guarantees delivery and provides credibility to the entire system.

Infrastructure. Adequate transport and reliable roads make it possible to move the grain efficiently to the warehouses and from there to the buyer's premises.

Support from financial institutions. Banks and other financial institutions are vital links. Their willingness to accept and finance warehouse receipts is a key requirement in structured trade.

A structured trading system is well-suited for grain because it is relatively non-perishable (compared to, say, fruit and vegetables). With proper drying and warehousing, grain can be stored for up to two years and still be safe to use as food. Grain is harvested once (or maybe twice) a year, but it is consumed all year round – hence the need for storage. Smallholder producers are the main grain producers in most of Africa and many other countries. Structured trading enables them to get together to bulk their grain and deposit it in a warehouse.

A structured trading system enables smallholders to access better markets, get better prices, obtain credit, and reduce postharvest losses. That means they can increase their incomes and improve their livelihoods and living standards. Traders, millers and other processors, on the other hand, get better quality, and consistent and reliable supplies of grains at a lower cost and effort. That increases their earnings and return on investment, and means they are in a position to provide a better service to farmers and consumers.

2 Postharvest

management on the farm

Members of the Iganga Adult Literacy Group in eastern Uganda used to shell their maize by beating the cobs with sticks. This was hard work and took a long time, so the group had to delay it while they planted the next crop. The sticks also broke plenty of kernels, which buyers did not like: they offered a low price for the group's output.

Then the group had the opportunity to rent a motorized thresher. This let them shell their maize much faster, resulted in fewer broken grains, and made it possible for them to sort the grain. They moved the grain to a warehouse and got a receipt for it. The group presented this to the bank, which accepted it as collateral for a loan to buy the inputs they needed for the next season.

At the warehouse, the manager found that the grain from the Iganga group was of excellent quality. He did not have to reject any. When the group came to sell, they were able to get a premium price.

* * *

Structured trade depends on having good-quality grain that conforms to certain minimum standards. Good postharvest management is vital for this.

This chapter focuses on what farmers and small-scale cooperatives can do to maintain grain quality. It covers the six steps listed in Box 3, from harvest until the grain leaves the farm or cooperative store.

The standards themselves are covered in Chapter 3.

Chapter 4 describes what commercial warehouse operators can do to maintain grain quality.

BOX 3. FROM HARVEST TO TRANSPORT OFF THE FARM

1. **Planting the right varieties**
   - Planting varieties that grow well and that the market wants
2. **Growing a healthy crop**
   - Providing fertilizer and irrigation
   - Controlling pests, weeds and diseases
3. **Harvesting at the right time and in the right way**
   - Bringing in the crop at the right time
   - Avoiding bad weather
   - Avoiding contamination with soil
4. **Threshing the grain carefully**
   - Enabling grain/cob selection
   - Reducing the space required for storage (threshed maize takes up less space than cobs)
   - Reducing grain susceptibility to pests
5. **Drying the grain properly**
   - Retaining maximum quality of crop
   - Reducing moisture for safe storage
   - Conforming to grade specifications
6. **Cleaning the grain well**
   - Removing foreign matter
   - Improving storability
   - Increasing purity and market value
7. **Correct storage**
   - Keeping the grain dry and free of pests until it can be taken to the warehouse
8. **Transporting the grain**
   - Transporting safely to the warehouse

Figure 3. Structured trade relies on good-quality grain that conforms to certain standards. Photo: Herbert Kirunda.

Why produce good-quality grain?

Producing good-quality grain brings many benefits:

- Farmers can sell their grain to different buyers and get a higher price for it.
- Traders, transporters and others in the grain trade can handle more grain and sell it to new markets, such as regional and international buyers. This leads to better business for all.

Traders may buy poor-quality grain from farmers at a low price, and then dry it and sieve it to remove broken grain and foreign matter so it conforms to grade requirements. But this reconditioning costs money and leads to substantial losses of grain. The result: less grain on the market, at a higher price.

Instead, it is better for farmers to produce good-quality grain that does not need reconditioning. This benefits everyone: no reconditioning costs and lower losses mean more grain on the market and lower prices for consumers.

Even if postharvest management is done well, grain will not remain at the same quality indefinitely. Its quality will decline naturally, even if there is no damage from pests or it is stored at the right moisture level. A particular quality of grain has a shelf-life, during which it will probably retain its grade (see Chapter 3). But after this period, it is likely to drop a grade.

People experienced in grain storage usually know the expected shelf-life of each grain type, depending on its starting grade and the conditions under which it is stored. For example, in the warehouse receipt system in Uganda, Grade-1 maize is given a shelf-life of one year in a bag store, or four months in a bulk store.

How to maintain grain quality

Traders and others can advise farmers on how to supply grain that fulfils their requirements. Here are some tips they can pass on to farmers.

Planting the right varieties

The first step is to ensure a good harvest. This is not strictly part of the postharvest chain, but the choice of crop variety and how it is grown affect the quality after harvest.

Figure 4. Planting the right varieties and growing a healthy crop are the first steps to market success. Photo: Herbert Kirunda.

Farmers should plant certified seed varieties that are best suited to the agro-ecological zone, and they should take into account the local conditions (climate, soil, irrigation, fertilizer). They should also bear in mind what varieties buyers prefer.

Some varieties experience bigger problems after harvest than others. For example, high-yielding hybrids are often more susceptible to insect storage pests.

Growing a healthy crop

It is important to keep the crop healthy while it is growing by providing fertilizer and irrigation, and controlling weeds, pests and diseases. A healthy crop produces good-quality grain.

Farmers may apply various pesticides to control pests, diseases and weeds in their crops. Pesticides may also be used after the harvest: during storage, transport, distribution and processing of grains and grain products. Pesticide residues in the grain may damage consumers' health.

Safe levels of pesticides residues, also called **maximum residue limits**, are set by national food safety authorities. For the East African Community, they are based on the limits for different food products set by the Joint FAO/WHO Codex Alimentarius Commission (Codex). These are posted on the Codex Pesticides Residues in Food Online Database, www.codexalimentarius.net/pestres/data/index.html?lang=en.

To keep residues to acceptable levels, farmers and grain storers should use only the pesticides approved for a given crop by the national authorities. It is

important to follow the manufacturers' instructions on applying the pesticides, including the stage and time of application on the crop, and the time between application and harvest.

Harvesting at the right time and in the right way

Harvesting either too early or too late can result in poor-quality grain and losses. Harvesting too early means the grain will be immature and underweight. Harvest too late, and pests may attack it, or it may be stolen.

The right time to harvest is when the growing process has finished, i.e., when the grain has reached physiological maturity.

- The plant will change colour from green to light brown or yellowish, and the grain will have a moisture content of 20–30%.
- Cereals like maize, sorghum and millet have a black layer just below the tip of the grain (Figure 5). This can be seen if the tip is removed.
- Maize cobs start to droop downwards (though not in all varieties).
- Bean pods turn from green to yellowish.

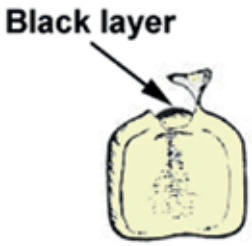


Figure 5. The black layer that forms at physiological maturity just below the tip of a maize grain. This shows that the grain is ready for harvest.

Grain should be harvested when the weather is warm and sunny (Figure 6). Otherwise it may be difficult to dry the grain fully. If maize is ready for harvest but the weather is wet, farmers can twist the stems to turn the cobs downward. This stops water from accumulating in the cobs.

The cobs, seed heads, pods, etc. must be kept off the ground to avoid contamination with soil. It is best to put the crop in sacks or clean containers.

In some places, harvesting starts with cutting the stems and stacking them into piles called "stooks". These are left to dry further before the grain is removed. This is generally not recommended: it may lead to more grain losses, and the grain may get wet if it rains.

Figure 6. Mature cereal grain should be harvested on a sunny day and put on a mat or in sacks.

The harvest should be taken out of the field as soon as possible, using clean, dry containers that do not let it spill out. It should be kept out of the rain and away from dirt and pests until it can be dried.

Threshing the grain carefully

Threshing frees the grain from the cob, seed head or pod. For smallholders who must do it by hand, this job takes time and is hard work. For maize, threshing is sometimes called "shelling".

The most common method of threshing by hand is to beat the crop with sticks. But this breaks a lot of the grain and so lowers the quality.

For maize, the husk has to be removed before threshing. When doing this farmers should separate out any cobs that are damaged or infested by insects, and make sure they are consumed or destroyed quickly. If they do not do this, the bad grain will be mixed with good, and the overall quality will be lower.

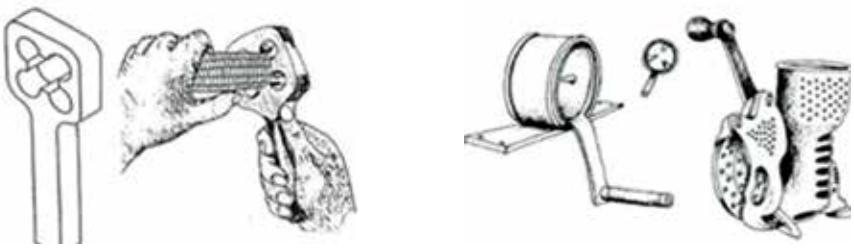


Figure 7. Some manual maize shellers.

Instead of beating the cobs, it is better to shell them by hand or use a simple manual sheller (Figure 7).

Machine threshing is much quicker and produces better-quality grain with fewer broken grains than threshing by beating with sticks. Because the threshing is done sooner, the grain has less chance to deteriorate. Threshing machines are expensive, so farmers often either rent one or get together as a group to buy one.

Drying the grain properly

The grain may be dried in the sun, in racks or cribs, or using a mechanical dryer.

- **Sun-drying.** This is the cheapest way to dry grain. The most common method for smallholders is to spread it out on a plastic sheet or tarpaulin, in a layer no more than 3 cm deep, and leave it exposed to the sun. It should be turned with a rake every hour. Every two hours, all the grain should be moved to one side of the sheet to allow any moisture on the sheet to evaporate. After 5 minutes, the process is repeated for the other half of the sheet, after which the grain is spread out again across the whole sheet. Chickens and others animals must be kept away to stop them from eating the grain or making it dirty. The grain should be covered at night and when it rains.

- **Drying on racks or in cribs.** Grain can also be dried on racks or in a crib. A crib is a long, thin structure (Figure 8) that air can pass through easily. It should be positioned at right angles to the prevailing wind to improve the ventilation. Cribs are usually used for unthreshed grain such as maize cobs (with or without the husk), sorghum or millet heads. They may be kept in the crib for some months. If the sides of the cribs are covered to prevent rain from getting in, they can also be used to store sacks of grain.

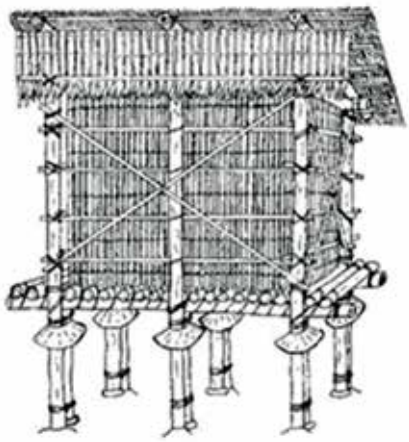


Figure 8. A drying crib: long and thin to allow good ventilation.

- **Mechanical drying.** Mechanical dryers use a fire (or other source of heat) and fans to dry the grain. They are used in large-scale commercial operations.

The grain must be dried quickly to a safe moisture level, below which mould cannot grow (Box 4).

BOX 4. MOISTURE CONTENTS NORMALLY RECOMMENDED IN EASTERN AND SOUTHERN AFRICA

Maize	13.5%
Sorghum	13.5%
Beans	14.0%
Groundnuts	7.5%
Sunflower seed	9.0%K

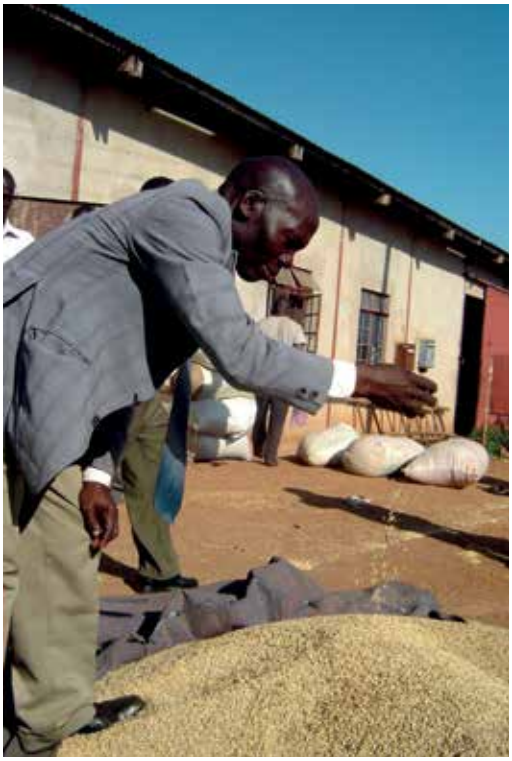


Figure 9. Experienced storage operators can tell if the grain is dry enough for storage by listening to the sound when it is poured. Photo: Herbert Kirunda

It is possible to check the moisture content in various ways (Box 5).

Good drying reduces microbial activity, especially of moulds that may produce mycotoxins (such as aflatoxin). It also hardens the grains, making it more difficult for insects and other pests to damage them.

Cleaning the grain well

Before storing the grain, farmers should clean it to remove as much foreign matter as possible. They can do this by winnowing it (letting it drop from a height and allowing the wind to blow away lighter impurities such as chaff or leaves), or by using a sieve (or handpicking) to remove heavier impurities such as stones.

Some threshing machines clean the grain at the same time as threshing it.

BOX 5. CHECKING THE MOISTURE CONTENT OF THRESHED GRAIN

Experienced farmers use several ways to check whether it is fully dried:

- Bite it to check how hard it is.
- Take a handful and listen as the grains drop (Figure 9).
- For beans that are dried in the pod, shake the pod and listen to the sound.

Salt method

Dry salt will absorb moisture from grain. This principle can be used to determine whether a cereal grain sample has a moisture content of above or below 15%. The method uses the following:

- A clean, dry glass bottle of about 750 ml capacity, with a cap that makes it airtight
- A cup of common salt.
- 250–350 g of the grain to be tested

The salt must first be dried by spreading it out on some plastic sheeting in the hot sun and leaving it for at least 3–4 hours until it is hard. It should be turned at intervals during this time. It can also be dried in an oven. The dry salt should be placed in a sealed container until it is ready for use.

The grain is tested by putting it into the bottle (which should be about one-third full) and adding 2–3 tablespoons (20–30g) of dry salt. The bottle should be closed tightly with the cap, shaken vigorously for 1 minute to mix the salt and grain, then left for 15 minutes.

If the salt sticks to the side of the bottle, the moisture content of the grain is above about 15% and is not safe for storage.

If the salt does not stick to the bottle, the moisture content is below 15% and the grain is safe for storage.

Moisture meter

Moisture meters (Figure 10) are quick, portable, simple to use and fairly accurate. They may be used routinely, for example, when grain is delivered to a grain store. They cost several hundred dollars, so would normally be used only at warehouses and by farmers' groups that handle a lot of grain.

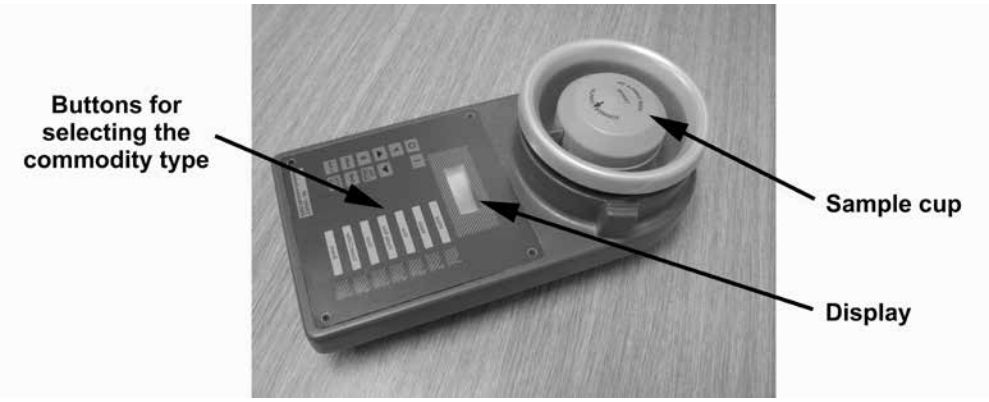


Figure 10. An example of a moisture meter

Moisture meters must be calibrated before use to make sure they are accurate. Most modern meters allow calibration data to be programmed into them so they read moisture content directly. Many automatically adjust the reading to take into account the temperature of the sample (which can affect the reading). The manufacturer may calibrate the meter, but such meters should be checked regularly to make sure they are still accurate. After calibration, a meter may be accurate to within ± 0.2% of the actual moisture content. Generally speaking, meters are accurate to within ± 0.5% in the middle of the moisture range (12% to 17% moisture content for cereals). Outside this range they are less accurate.

Correct storage

For structured grain trading, the grain must be well stored, probably in commercial facilities, fairly soon after harvest. However, this will not always be possible, and farmers may keep grain for many months before moving it into a commercial facility or releasing it onto the market. In addition, many farmers also wish to store some of their output for their own use. So good farm storage is important to maintain grain quality for the market and for home consumption. Farmers should be reliably informed about how to store their produce well. See the list of *Resources* at the end of this publication for information on how they can do this.

For grain that will be marketed, the most common choice for storage is an open-**weave sack** made of jute, sisal or polypropylene. Open-weave bags should be put on pallets to lift them up off the floor, and the pallets should be kept away from the walls (Figure 11). Insects can get into open-weave bags easily, so the grain inside will become infested after about 3 months unless properly treated.

If the grain has to be stored for longer periods (especially for home consumption), other types of store such as bins, silos(Figure 12), drums and fully sealed bags may be more suitable.

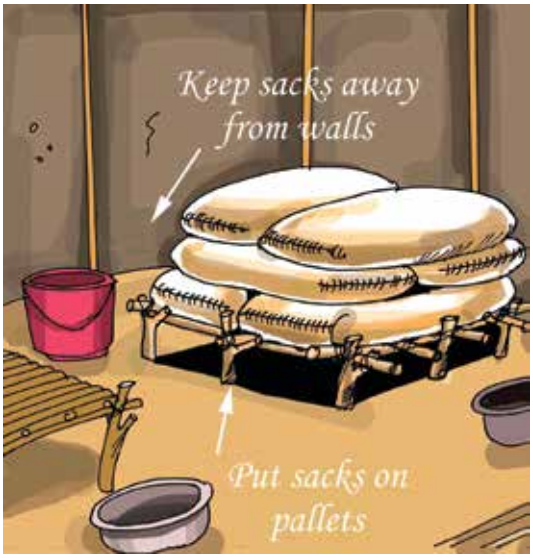


Figure 11. In the house, sacks should be stored on pallets, away from walls. Check regularly for any problems.

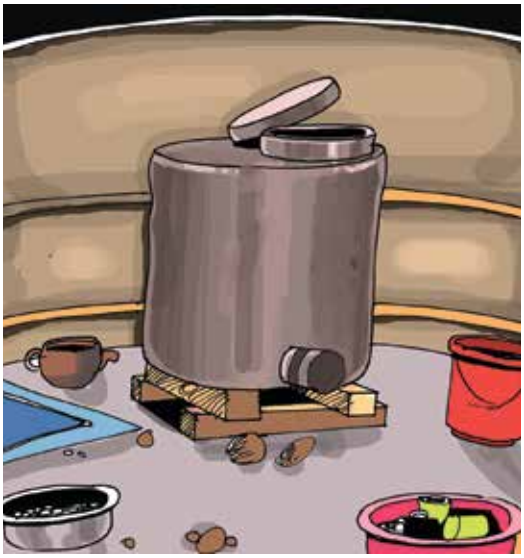


Figure 12. To store grain at home in bulk, it should be put in a silo or other container.

Transporting the grain

The farmer may sell the grain to a trader, take it to a cooperative or community warehouse, or deliver it to a commercial warehouse.

On its journey, the grain may be moved by truck several times. In doing this, these precautions should be followed:

- The vehicle should be clean and dry and have no sharp edges that might tear the sacks.
- The sacks should be loaded carefully into the vehicle and counted. If they are taken out of a warehouse the storekeeper should sign a release form for this number of sacks.
- The weight capacity of the vehicle should not be exceeded.
- There must be a tarpaulin to cover the sacks in case it rains.

In conclusion

Farmers have to use the right postharvest methods for the grain to be at a grade needed by a structured grain market. But these methods cannot be considered in isolation from the farmers' situation.

Postharvest practices must be sustainable. The costs must be justified by higher prices and lower losses. Warehouse operators and traders can recommend sustainable, cost-effective ways to reduce postharvest losses that give farmers an incentive to improve their practices.

An important aim of **better postharvest management is to reduce grain losses.** For more information on postharvest grain losses in sub-Saharan Africa, see the African Postharvest Losses Information System (Box 6).

BOX 6. APHLIS: THE AFRICAN POSTHARVEST LOSSES INFORMATION SYSTEM

APHLIS (www.aphlis.net) is a source of information on postharvest losses of cereal grains in sub-Saharan Africa. It gives estimates of weight losses in tables and interactive maps, using information from a network of local experts from each country in eastern and southern Africa. It also offers tips on reducing postharvest losses.

APHLIS also has a downloadable calculator that enables practitioners to make their own estimates of postharvest losses.

3 Grain standards

When people buy grain, they need to know exactly what is in the bag or silo. Is it high-quality grain, free of contaminants, and suitable to be ground into flour or meal for human consumption? If it is not suitable for human food, can it still be used as animal feed?

Grain standards help buyers know such things. They specify the characteristics for the grain and set the requirements for three things: safety, quality, and sampling and test methods.

- **Safety requirements** cover things that may harm the consumer: the presence of mycotoxins and other poisonous substances, pesticide residues and physical materials (like stones or pieces of metal) that can get into the grain.
- **Quality requirements** cover other things that processors or consumers may be concerned with, such as moisture content, broken grains, diseased grains and foreign matter.
- **Sampling and test methods** cover the procedures to be used in taking representative samples for analysis, as well as the procedures to follow in carrying out the analysis to confirm whether the grain meets the safety and quality requirements.

Grain safety is not negotiable and should not be compromised. If the grain is not safe for human consumption it must not be traded unless it has been treated to eliminate the hazard. For example, stones can be removed mechanically; metal can be removed using magnets. If that is not possible, the grain will have to be disposed of in an appropriate way (for example, by incinerating it).

Grain quality, on the other hand, depends on people's preferences. Many industrial processors require certain types of grain. A miller who grinds flour,

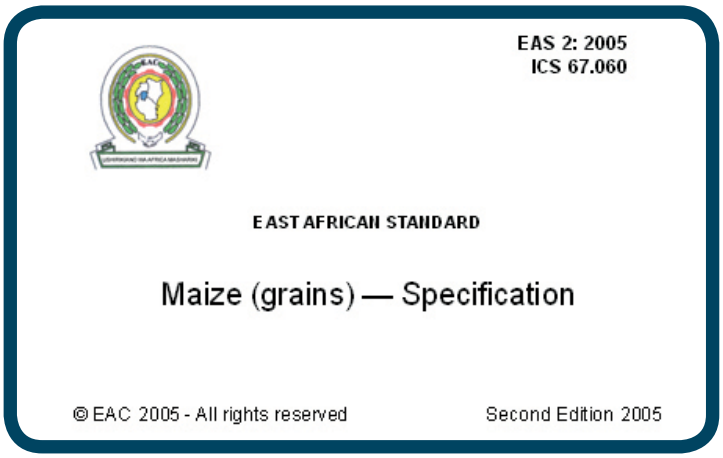


Figure 13. Each type of grain has its own specifications. This is the cover of the East African Standard for maize grains, published by the East African Community

for example, needs food-quality grain with very low levels of impurities and contamination. He or she is prepared to pay a high price for such grain. A producer of animal feed, on the other hand, is likely to accept lower-quality, cheaper grain. A brewer may want broken grains, which the miller may reject.

Each type of grain has its own standards: the standard for maize is different from that for sorghum or soybeans, for example.

Grades

Standards classify grain into several grades to make it easy for people in the grain business to know what they are dealing with. Grade 1 is the best grade. It has the highest quality and is likely to fetch the highest price. Grades 2, 3 and so on are lower quality: they may contain higher amounts of foreign matter, damaged grain, etc.

Grading has many advantages for buyers and sellers.

- A **farmer** can get a higher price for a bag of Grade 1 grain than if the grain has not been graded.
- A **buyer** is confident that the grain is of a particular quality, so is willing to pay a higher price.
- A **warehouse operator** can check the grain when it arrives, and make sure its quality is maintained while it is in the warehouse.
- A **trader** can announce she wants to buy Grade 2 grain, and everyone knows exactly the quality of grain she is interested in.

Where everyone is confident about the reliability of grades, it is not necessary to inspect the grain visually. That makes it possible to buy and sell the grain without

TABLE 1. WHAT DO STANDARDS AND GRADES COVER?

Safety requirements Is the grain safe?	**General quality characteristics** Characteristics of the healthy grain	**Specific quality requirements** Caused by outside factors
Mycotoxins (poisons produced by fungi) • Aflatoxins • Fumonisins Pesticide residues Physical materials (stones, glass and pieces of metal) Poisonous or toxic and noxious seeds	Shape Size Structure Natural colour Flavour Smell Examples: • Maize: dent, flint • Maize: yellow, red, white • Rice: long-grain, short-grain	Moisture content Foreign matter Other grains Filth Contaminants Physical damage Broken grains Defective grains Stained grains Discoloured grains Weather-damaged grains Diseased grains Mouldy grains Blemished or damaged grains Insect- or vermin-damaged grains
Not covered by grades (Grades cover only grain that meets all safety requirements)	Not covered by grades	Covered by grades

Note: Definitions of the terms used above are discussed in the text.

having to go to check it, and without having to transport it. The grain can stay in the warehouse while its ownership changes. That saves enormously on costs.
To know what grade a bag of grain is, it has to be measured. Various tests and types of equipment may be needed: such as a sampler to take a sample to measure, a moisture meter to measure moisture content, and a sieve to check for broken grain and foreign matter. The person who runs the collection point where farmers deliver their grain, or the manager of a cooperative warehouse,

should have such equipment and check every consignment of grain as it comes in. Many traders carry this equipment with them. Big warehouses and millers have laboratories to do more sophisticated tests.

An experienced farmer or buyer can look at a handful of grain and tell what grade it is. Training institutions train professional graders who work for warehouses and processors. Box 5 gives some simple techniques that anyone can use to check their grain.

The grade of a grain may change over time – for example, if it is attacked by mould or insects, and as the grain ages. That means it may be necessary to check a consignment periodically to assign it to the correct grade. It is the warehouse's responsibility to store the grain correctly so it does not deteriorate (see Chapter 4).

Grades cover many, but not all, of the characteristics of grain. For example, they do not necessarily include protein content, hardness or place of origin, even though buyers may be interested in such characteristics. A buyer may want to buy "flint" rather than "dent" maize. But this is not a characteristic that affects the grade: Grade 1 dent is exactly the same as Grade 1 flint.

BOX 7. WHAT'S IN A STANDARD?

A standard is a published document that establishes a common language, and contains a technical specification or other precise criteria and is designed to be used consistently, as a rule, a guideline, or a definition.

A typical standard contains these sections:

1 Scope
2 Normative references
3 Terms and definitions
4 Presentation
5 Essential composition and quality factors
6 Contaminants
7 Hygiene
8 Packaging
9 Labelling
10 Methods of sampling and analysis (testing)
11 Criteria for conformity

Annex Method for sampling and grading of grains

How do grain standards help?

Grain standards are vital in structured trading systems:

- They specify the **grain characteristics**, the limits that are acceptable for each characteristic, and how to measure them. That facilitates production, processing and inspection of the grain.
- They identify **economic factors** that are important to end-users.
- They establish a **common language** and set of rules between trading partners. If everyone knows what is meant by "moisture content" or "aflatoxin", and knows how to measure it, they can be confident they are talking about the same thing when they buy or sell grain.
- They ensure **food safety** because they cover some of the main factors that can reduce food quality and harm consumers.
- The reflect **storability**: poor-quality grain can be stored only for a short time.
- They facilitate **trade**: grain products can be readily accepted in other parts of the country, in other countries or regions. The common language makes domestic, regional and international trade easier and prevents technical barriers to trade.
- They support **food security** by making it easier to import and export grain and transport it to where it is needed.
- They promote **quality** by providing incentives to grain producers and handlers for ensuring that grain is good quality, and by setting requirements for packaging and transport.
- They form a basis for **pricing**. Because people know what grade the grain is, they can decide how much to buy and sell it for.

Who sets standards?

Standards for grain in Africa are set by national governments. Regional organizations attempt to harmonize these, and it is up to each government to implement them in their national standards.

The relevant regional organizations are:

- **COMESA**: the Common Market for Eastern and Southern Africa
- **EAC**: the East African Community
- **ECOWAS**: the Economic Community of West African States
- **CEEAC**: the Economic Community of Central African States
- **SADC**: the Southern Africa Development Community.

These standards are mostly based on international standards published by:

- **Codex**: the Codex Alimentarius Commission of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO)
- **ISO**: the International Organization for Standardization
- **IPPC**: the International Plant Protection Convention.

Efforts are also taken to review standards published by the major trading partners like the European Union, the United States, and Japan.

It is not possible to impose a common standard for all regions because the appropriate levels depend on factors such as the climate, which differs from place to place. Temperate countries, for example, all store and trade in grain at up to 15% moisture content; such a high level is not suitable for the tropics, where ambient temperatures are higher.

International standards are recognized under the World Trade Organization (WTO) Sanitary and Phytosanitary Measures Agreement as the benchmarks for food trade. That allows them to form the basis for negotiations and for resolving disputes between buyers and sellers at national, regional or international levels.

Normally warehouses apply standards as required by the buyers. Some buyers use national standards while others use their own specific standards, for example to ensure they get a specific type of grain suitable to make specialized products like infant foods. Grain graded using different standards is stored separately. Where the buyers have not specified otherwise, the national standard is followed.

Grain safety requirements

Mycotoxins

Myco = fungus, *toxin* = poisonous substance

Mycotoxins are substances produced by fungi (moulds) and are harmful to consumer health. They include **aflatoxins** and **fumonisins**.

The fungi may infect the crop in the field or in the store. Uninfected grain can be contaminated without the fungi being visible.

Mycotoxins are more likely to be a problem if the weather is hot before the harvest, if the crop suffers from drought, if the weather is wet at harvest

time or afterwards, or if the crop is attacked by insects. They may also be a problem if the grain is mechanically damaged or is not dried to the correct moisture level in good time.

Aflatoxins

Aflatoxins are a type of mycotoxin produced by many species of aspergillus fungus, the most important being *Aspergillus flavus* and *Aspergillus parasiticus*. These moulds occur widely on inadequately dried food and feed grains in subtropical and tropical climates. Maize and groundnuts can be particularly affected.

In the field, aspergillus is a cause of ear rot of maize. This appears as an olive-green powdery mould when the husks on the ears (Figure 14) are peeled back. On maize grain, it appears as an olive green or grey-green colour on the kernels. However, it is not possible to visually identify aflatoxin-infected grain: tests are necessary to detect it.

Not all mouldy grain has aflatoxins, but the risk of aflatoxin contamination is greater in damaged, mouldy grain than in grain with little mould.

Figure 14. Aspergillus growth in the field.

Aflatoxins are dangerous poisons, and high levels can be lethal (Box 8). Animals fed with contaminated grain do not grow well, and their embryos may be affected.

BOX 8. AFLATOXIN: A SERIOUS THREAT TO FOOD SAFETY

In April 2004, 317 people in rural Kenya fell ill, and 125 died of aflatoxin poisoning. The source of the outbreak was contaminated maize that was grown locally.

A survey found that aflatoxin was common in maize grown in the area. The researchers tested maize from vendors and markets, and found that 55% of the maize products had higher aflatoxin levels than the official limit of 20 parts per billion (this limit has since been lowered to 10 parts per billion). One-third of the products had more than 100 parts per billion, and 7% had levels over 1,000 parts per billion.
The maize had been harvested during unseasonable, early rains. It had been stored while it was still damp. Those are ideal conditions for the fungi that produce the toxins.

Farmers had then sold the tainted maize, and it got into the distribution system, contaminating much of the grain in the market and exposing consumers to the toxin.

More information: Lewis et al. 2005.

Aflatoxin contamination can be prevented by stopping the aspergillus fungus from attacking the crop when it is in the field, after harvest and in storage:

- **In the field.** Farmers should control insects that damage the ears and that allow them to be infected by mould. They should check the ears for aspergillus ear rot from the "dent" stage in maize (when the maturing grains start to harden, about a month after silking) up to harvest-time. They should check 5 to 10 locations in a field. This is done by peeling back the husks of 10 ears and inspecting them for olive-green powdery mould. If more than 10% of the ears show signs of aspergillus ear rot, the grain should be harvested early.
- **Harvesting.** Farmers should avoid damage to the kernels during harvesting. Before storing the grain they should clean the bins and grain-handling equipment, and remove broken kernels from the grain.
- **Storage.** The moisture content should be at or below 13.5% to prevent the development of moulds and toxins. Storage insects should be controlled. The stored grain should be checked every 2 weeks for temperature

changes, crusting, hot spots, moisture and mould. If any of these conditions are found, the temperature must be reduced by aerating the storage bin, breaking up hot spots, or removing spoiled grain.

The East African Community has set a maximum acceptable level of 5 parts per billion for aflatoxin B1, and a limit of 10 parts per billion for total aflatoxins.

Grain that is contaminated at levels greater than 10 parts per billion may not be traded. Blending aflatoxin-contaminated grain with clean grain is not allowed, and blended grain may not be traded.

Fumonisins
Fumonisins are another type of mycotoxins, produced by a fungus called *Fusarium*. They cause diseases of the alimentary canal – the mouth, gullet, stomach and intestines.

The East African Community sets a limit of 2 parts per million for fumonisins.

The procedures used to control aflatoxins also control the growth of *Fusarium*.

Physical materials
Some physical materials may harm consumers' health: they include pieces of glass, metal and sand. They may also damage milling equipment. They should not be present in the grain.

Toxic and noxious seeds
Some weeds and plants that grow in cereal fields, like *Datura*, have poisonous seeds. Their seeds may get into the grain, especially if it is machine-harvested.

General grain quality attributes

A healthy grain has certain characteristics: its shape, size, structure, natural colour, flavour and smell. These characteristics determine the type and description of the grain. They make it possible to identify it and check it for purity.

Different varieties of the same crop have different features. For example:

- Maize varieties may be **flint** (with hard grains) or **dent** (soft and floury grains, with a dent in the surface when they are dried). The grain may be **yellow**, **white** or **red** (though this is rare).
- Rice may be one of several varieties, each of which has different cooking and eating characteristics.

Such physical characteristics are very important. They determine the use of

Yellow flint maize

Red/black flint maize

White dent maize

Red dent maize

Figure 15. Different types of maize

the grain, consumer preferences, and prices. They must also be taken into account when designing grain-handling equipment, storage management and quality analysis systems.

Specific quality attributes

These are characteristics of the grain that are caused by outside factors. They may have positive or negative effects. They affect the grading of the grain (Table 2).

Moisture content

When it is harvested, grain contains a certain amount of water. It can also absorb liquid water (if it is left out in the rain) or water vapour from the air. When it does this, its weight increases.

Grain can also release water into the air (when it is dried or aerated). When this happens, its weight goes down. So the weight of a bag of grain depends partly on how much water it contains. Understanding this is important because most commercial transactions are made on the basis of weight. If the moisture content is too high, the grain may be damaged by mould or attacked by insects. Millers will get less flour per unit weight of grain.

Drier grain will last longer in the store. The moisture content of dry grain ranges from 6% to 15%, depending on the type of grain and the climate conditions where the grain is stored. In cool, temperate areas, maize can be stored at 15% moisture. As noted, this is not possible in the tropics where the temperature and humidity are high: here the grain must be drier.

Regulatory authorities have standardized the moisture content of the major grain products traded (see Box 4 in the previous chapter).
Dry grain absorbs moisture from the air easily, so its moisture content may drift upwards over time. That would push it into a lower grade (or, in the East African standard for maize in Table 2, out of the grading scheme altogether), even though it fulfils all the other criteria for a particular grade.

Foreign matter
This is any inedible material in the grain. It may include:

- Earth, sand, soil, dust, stones, metal and glass.
- Organic matter from plants: seed coats, parts of stem, seed husks, pods, leaves and weed seeds.
- Organic matter from animals, alive or dead: insects, mites, rodent and bird droppings, insect excretions. This material is often called **filth** (see below).

Foreign matter is not just a quality issue. It is also a safety concern because it may be harmful to health (see *Grain safety requirements* above).

Other grains
These are other edible grains, whole or broken, that are not of the crop in question. For example, a bag of maize may contain some grains of sorghum or soybeans, particularly if it is machine-harvested.

Filth
This is impurities of animal origin, such as animal waste, dead worms, insects, insect wings, animal hair or fur and skins.

Contaminants
These are any substances not intentionally added to the grain. They may have got into the grain as a result of the production, processing, packaging, transport and storage of the grain, or they may be the result of environmental contamination. They do not include insect parts or rodent hairs ("filth") or other extraneous matter ("foreign matter").

Physical damage
This refers to the physical damage to the grain, such as breaking, splitting or cracking. It may lead to changes in the composition of the grain and expose it to attacks by fungi or insects.

Broken grains
These are fragments of grain below a certain size. They can lead to the grain quality declining more quickly than if the grains are whole. They are caused mostly by poor handling – such as using a poorly adjusted sheller or threshing

the grain by beating it with a stick. There are tests to measure the amount of broken grains. For example, according to the ISO 5223 standard, which specifies test sieves for cereals, broken grains of maize are those that pass through a 4.50 mm round metal sieve.

Defective grains
These are grains that are damaged by pests, discoloured, diseased, germinated, mouldy, immature or shrivelled, or otherwise materially damaged (see the items below). They do not include broken grains.

Blemished or damaged grains
These are grains that are damaged by insects or vermin, stained, diseased, discoloured, germinated, frost-damaged, or otherwise materially damaged.

Stained grains
These are grains whose natural colour has been altered by external factors such as the soil or weather. These factors can cause dark stains or discolorations and a rough appearance.

Discoloured grains
These are grains that are discoloured by heat but are not obviously damaged by mould. They may be darkened, wrinkled, blistered, puffed or swollen, and often have discoloured, damaged germs. The seed coat may be peeling or may have peeled off completely, giving kernels a checked appearance. This colour change may happen in unfavourable storage conditions.

Weather-damaged grains
These are grains that are bleached or blistered. The seed coat may be peeling. The germs may appear dead or discoloured.

Diseased grains
These are grains made unsafe for human consumption due to decay, mould, bacterial decomposition, or other causes. It is possible to see the damage without cutting the grains.

Mouldy grains
These are kernels and pieces of kernels that are:

- Visibly infected by fungi and have black, blue, green, yellow or white fungal growth anywhere on the kernel, or have fungal growth under the bran layer of the kernel.
- Infected by ear-rot and have red, pink or brown discolourations. The kernels are partially to completely infected.

Mould may produce aflatoxins and make the grain unsafe for consumption (see *Grain safety requirements* above).

Insect- or vermin-damaged grains
These are grains with obvious holes or tunnels made by insects, insect webbing or refuse. The germ or part of the kernel may be missing or chewed. The damage may occur before or after the harvest.

Grading

If the grain meets the safety requirements, it can be graded using specialized equipment that checks the specific quality attributes described above.

The grader checks a sample of the grain according to the various criteria and puts it into a grade. If it exceeds the limit on one of the characteristics in a grade, it must be classified in a higher grade. Table 2 gives an example of the maximum permitted levels for grading maize.

TABLE 2. MAIZE GRAIN GRADES IN THE EAST AFRICAN STANDARDS

Characteristics	Maximum level (%)		
	Grade 1	Grade 2	Grade 3
Moisture content	13.5	13.5	13.5
Foreign matter	0.5	1	1.5
Inorganic matter	0.25	0.5	0.75
Filth	0.1	0.1	0.1
Broken kernels	2	4	6
Rotten and diseased grains	2	4	5
Pest-damaged grains	1	3	5
Immature/shrivelled grains	1	2	3
Discoloured grains	0.5	1.0	1.5
Total defective grains	**4**	**5**	**7**
Aflatoxins	10 ppb	10 ppb	10 ppb

ppb = parts per billion

Packaging

Standards specify requirements for the packaging that must be used for grain:

- Grain and grain products must be packaged using food-grade materials to safeguard the safety, quality and nutritional characteristics of the product.
- The packaging should withstand the conditions in storage, transportation and distribution.

- It should prevent the grain from being damaged by impact or crushing, contaminated by insects and microorganisms, or affected by moisture, air or odours.
- It should prevent the grain from spoiling or losing value and volume through leakage or spillage.

If the grain is loaded and unloaded by hand, the bags may weigh at most 50 kg. Most countries have signed an International Labour Organization (ILO) agreement to this effect.

BOX 9. EXAMPLE OF GRADING

A bag of maize has 12% moisture, 0.4% foreign matter, 0.1% inorganic matter, 2.5% broken kernels, and a total of 3% defective grains. What grade is it, according to the East African standards?

Check Table 2 for the grade limits.

Answer: Grade 2. It has too many broken kernels to qualify for Grade 1 (limit = 2%).

Challenges

For local trade, the buyer can inspect the grain directly, so it is not necessary for grain to comply with the standards described above.

For structured grain trading, however, it is necessary to comply with the standards. That takes expertise and money. Everyone in the chain must be aware of the standards and what they mean.

Adopting standards in a country takes time and effort. It requires the cooperation of and close coordination with the private sector, which is the main user of standards. It also involves many government agencies that regulate agricultural trade and food safety, including national standards organizations and nutrition authorities, plant-protection organizations, weights and measures agencies, customs authorities, and public health and food and drug authorities.

4 Commercial

grain handling, storage and warehousing

Lesiolo Grain Handlers Limited (LGHL) is a grain handling and storage firm in Kenya that handles maize, wheat, barley and sorghum. The company has its own storage facility with a capacity of 30,000 tonnes and has leased another 50,000-tonne facility from the National Cereals and Produce Board. LGHL intends to expand its capacity by 60,000 tonnes by constructing facilities in Nakuru and Kitale.

LGHL handles over 100,000 tonnes of grain a year. Its services include grain grading, weighing, cleaning, drying, seed-dressing, fumigation and storage. LGHL was the pilot certified-warehouse operator under the Eastern Africa Grain Council's warehouse receipting system, launched in 2008. Since then, over 3,000 tonnes of grain have been handled under this system. By storing their grain until the market price is high enough for sale, farmers have benefited from commodity financing and higher margins. LGHL intends to expand its services across East Africa.

* * *

This chapter covers the commercial storage and warehousing of grain. It describes the advantages of commercial warehouses, how they operate, the types of grain losses that may occur while the grain is in storage, how the warehouse operator deals with risks, and how warehouses fit in the structured grain trading system.

Commercial grain handling and storage

Commercial grain handling, storage and warehousing companies are businesses that offer their services to grain **depositors** (farmers, traders, co-operatives, non-governmental organizations, etc. who place their grain in the warehouse for a fee). These handling and warehousing companies aim to make a profit. They are answerable to the depositors for the grain left in their custody.

Warehouse operators do not own the grain that they store; they earn their money from the handling and warehousing fees they charge. This means, for example, that if they go bankrupt, the grain cannot be sold off to pay their debts.

Commercial warehouses have to meet certain minimum standards. They need to have:

- Professional workers trained in grain handling and safety.
- Equipment for weighing, grain analysis and storage.
- Procedures to ensure that the grain is safely handled and stored.
- Security to ensure the safety of the grain, equipment, employees and the public.

Figure 16. Lesiolo Grain Handlers' silos in Nakuru, Kenya

Why use commercial storage services?

After harvest, farmers are faced with a choice: sell the grain immediately, or store it? If they store it, they have to decide whether to put it in their own or a cooperative store, or in commercial storage.

Traders face a similar choice: they can immediately sell the grain they have bought, or keep it until they find a purchaser who is ready to pay the right price.

Commercial storage services offer farmers and traders a number of advantages:

- **Lower costs.** The farmer or trader does not have to invest in his or her own storage facilities and equipment, or in the staff to manage the grain.
- **Storage space.** Farmers or traders often have little storage space, or it may be unsuitable for storing grain for long periods. They may have more grain than they can safely store themselves.

- **Grain-handling equipment.** Individual farmers and traders cannot afford grain-handling equipment such as dryers, cleaners and fans. Commercial grain handlers have such facilities.
- **Convenience.** When the farmer or trader deposits the grain in a commercial warehouse, the warehouse operator takes over responsibility for handling and storing it, in return for a fee. This leaves the depositor free to do other things.
- **Quality management and pest control.** Grain storage is one of the major challenges farmers and traders must deal with. Some lack the skills and experience in managing grain on-farm or in cooperative stores, so their grain deteriorates quickly. They may not be allowed to use restricted pesticides (such as phosphine) for fumigation. Commercial grain handlers offer such services at an affordable fee.
- **Security.** Individual farmers or cooperatives may be unable to protect the grain from thieves, leaky roofs or fire. They may find it difficult to get insurance for a crop in their own store. Commercial grain handlers are normally insured, and are obliged to compensate depositors if the grain is stolen or spoiled. They must be insured if they are to issue warehouse receipts.
- **Professional services.** Commercial grain handlers provide professional services so they can attract repeat customers, compete with other handlers, and avoid having to compensate depositors for spoilt grain.
- **Transfer of ownership.** If the grain is in commercial storage, the grain depositor can sell it to a buyer without having to move it somewhere else. This reduces losses and costs due to bagging or re-bagging, spillage, theft, etc.
- **Linkage to markets and structured trade.** Some commercial storage providers link farmers and traders to opportunities for structured trade and commodity financing, by issuing warehouse receipts and facilitating commodity financing (see Chapter 6). Some commercial warehouses also have a network with buyers and can link farmers to better markets (or actually arrange buyers) for the stored grain. Because commercial storage firms store grain from many producers, larger buyers can come there to purchase large quantities of grain. That saves such buyers money: they do not have to go around many places to buy small amounts at each location.

Warehousing contracts

Normally, when a farmer or trader delivers grain to a commercial grain handler, he or she is given a contract to sign. This is an agreement between the depositor and the warehouse operator to provide certain particular services (such as drying and storage), in exchange for payment in cash or grain (valued at the market price). Box 10 lists the items covered by a typical contract.

BOX 10. WHAT A WAREHOUSE CONTRACT COVERS

The parties to the contract	E.g., a farmer or farmer group and the warehouse operator
The services requested by the depositor	E.g., drying, cleaning and storage
Standards to be met	See Chapter 3
Payment for the services	In terms of money or grain of equivalent value
Procedure for delivering or collecting grain	
The handling losses expected	See the section on Storage losses below
Responsibilities of the parties involved	
Arbitration, applicable laws and jurisdiction	The jurisdiction is the country whose laws will be used to settle disputes
Insurance and compensation for losses	

Warehousing operations

Grain warehousing involves various operations to ensure that grain is in good condition when it is received, and stays in good condition until it leaves the warehouse. The grain from a warehouse should meet certain market standards, depending on its intended use (see Chapter 3).

The warehouse has the duty to care for the grain in its custody. The grain depositors pay for its services, and they expect to get value for their money. The warehouse operator keeps track of the services it provides and charges the clients accordingly.

To maintain grain quality, the warehouse has to control various factors that can affect that quality. These include:

- **Biotic factors:** rodents, birds, insects and moulds.
- **Abiotic factors:** grain rubbish, broken kernels, temperature, humidity and moisture content.

Warehousing operations can be divided into:

- **Primary services.** These deal with the grain directly and generate revenue for the warehousing company. They include such services as receipt of the grain, grading, weighing, drying, cleaning, storage, bagging and dispatching. These operations ensure that the grain is put into a suitable condition to be stored for a long time at good quality.
- **Supporting processes.** These make the primary operations efficient and effective. They include quality management, human resource management, inventory management, equipment maintenance, health and safety, and procurement (Figure 17).

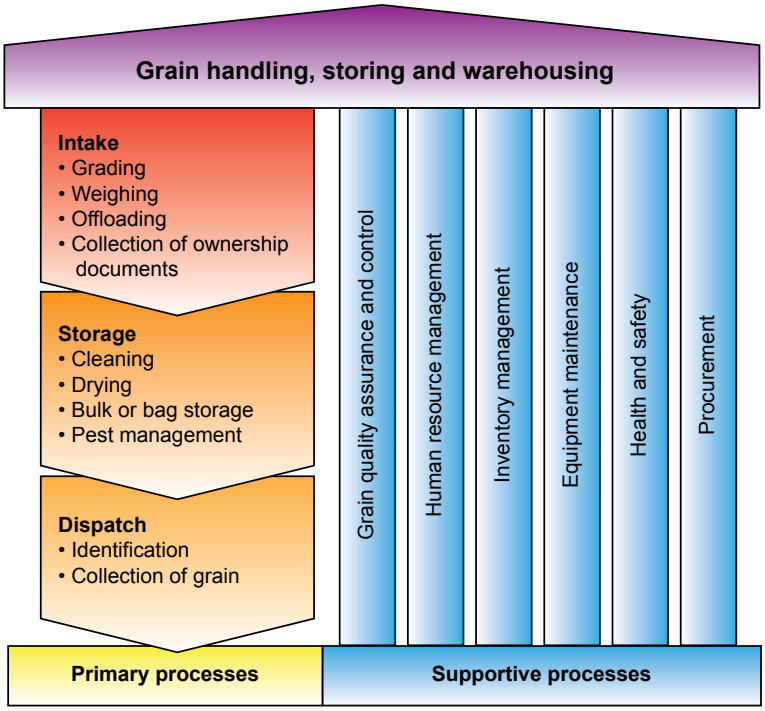


Figure 17: Primary and supportive commercial storage and warehousing processes

Below is a description of the typical commercial grain storage and warehousing processes.

Grain sampling, grading and quality management

When a depositor delivers grain to the warehouse, it is first graded. A warehouse staff member takes a sample of the grain for analysis, and checks it against the **standards** that the warehouse uses (see Chapter 3). The results

of the analysis allow a warehouse operator to accept or reject the grain, and to classify it for storage or marketing.

Grading is part of quality management. This is something that warehouse operators do to monitor and keep the grain at an optimum state throughout the entire handling and storage process. That, in turn, is important because it determines how long the grain can be stored, and how successful the warehousing firm is.

Quality management aims to ensure that:

- The grain received meets some minimum quality standards.
- The moisture content is measured correctly when the grain is received, and it is monitored after drying and during storage.
- The grain is stored only for as long as it is safe, at the right temperature and relative humidity, and these factors are monitored at appropriate intervals.
- Records of operations on the grain are kept.
- Pest management is carried out appropriately and at the required time, and its effectiveness and efficacy are monitored.

Some countries require that only certified graders are allowed to grade grain. The graders are normally certified by the national standards body. Grain graders and inspectors need a minimum set of equipment to do their job.

Weighing and receipt of the grain

After grading, the next step is to weigh the consignment of grain, using scales, a portable platform or a weighbridge. Knowing the weight provides the basis for storage, handling and trade. It also determines how much the warehouse will charge the depositor. The weighing must be done accurately, and the warehouse must have a certificate showing that the scales have been inspected and calibrated. The depositor may ask to see this certificate.

The warehouse informs the depositor how much he or she has delivered. After weighing, grading and receiving the grain, the warehouse operator is able to calculate how much grain the depositor is entitled to get back. The grain entitlement is the amount that was received, less the amount of foreign matter as analysed during grading, and less the amount of moisture that will be lost during drying.

The warehouse operator usually gives the depositor the following documents:

- A **weight certificate** (e.g., the weighbridge ticket) showing how many kilograms of grain have been delivered).

- A **grading certificate** showing the results of the grain analysis.
- A **goods-received note** indicating the ownership of the grain that has been deposited. (In some cases, a weight certificate may act as a goods-received note.)

If the warehouse operates a warehouse receipt system, the warehouse operator may give the depositor a warehouse receipt (see Chapter 6). The weight on the warehouse receipt is the weight the depositor is entitled to after accounting for moisture loss and removal of foreign matter.

Grain cleaning

The grain has to be cleaned to remove dirt, sticks, stones, metal and other foreign matter. Warehouses have equipment to do this.

Cleaning the grain is important for several reasons:

- It reduces the energy required to dry the grain.
- It allows more grain to be stored.
- It helps maintain quality by removing materials that could cause it to deteriorate during storage.
- It removes objects that might damage grain-handling equipment.
- It improves the effectiveness of fumigation.
- It increases the market value of the grain.

Drying

If the grain contains too much moisture, the warehouse operator will have to dry it so it can be stored for a long time without deteriorating too quickly. Drying improves storability because it reduces the respiration of the grain, and makes it harder for insect pests and fungi to survive.

Drying may be done by sun drying or using mechanical dryers (see Chapter 2). Commercial grain storage firms normally use mechanical dryers that blow hot air through the grain to remove the moisture.

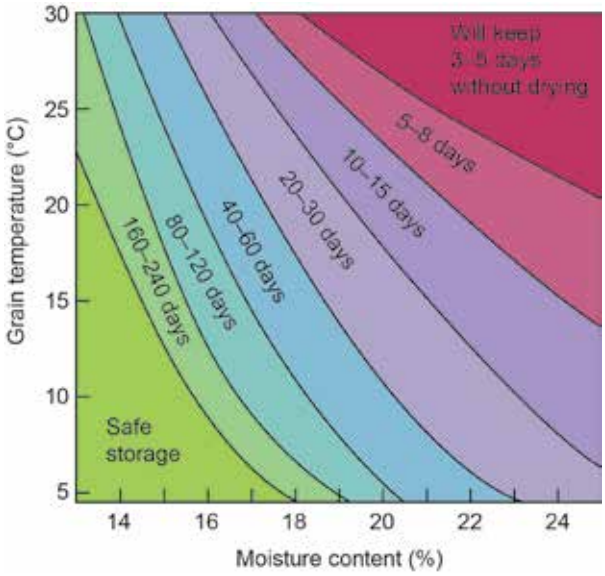
If the grain cannot be dried straight away, it heats up because of respiration. That can reduce the viability of grain that is to be used for seed or for brewing, and may encourage heat damage, fungi and eventually pests. To prevent it from deteriorating, the warehouse operator may spread it on a tarpaulin or plastic sheet, or blow cool air through a silo to remove the excess heat.

How long grain can be stored depends on a number of things. Considering just moisture content and temperature:

- At a temperature of 25°C, grain with a moisture content of 22% will keep for only 3–5 days without drying.

- If dried to 13% moisture, the same grain can be stored at the same temperature safely for 160–240 days (Figure 18).

Lower climatic temperatures make it possible to store grain for longer. But the warehouse cannot control climatic temperatures, so must keep the grain well aerated to keep its temperature as low as possible. This makes drying to the right moisture level all the more important.



Adapted from Friesen and Huminicki 1987

Figure 18. The lower the moisture content and the cooler the temperature, the longer grain will keep.

Inventory control

Inventory control means recording and accounting for the grain the warehouse receives, stores and dispatches. The warehouse makes adjustments on the quantity delivered to reflect the rubbish and any moisture content removed, along with any allowable handling loss. This is a very important part of warehousing and may determine the success of the entire business.

A good inventory management system involves monitoring a number of activities, including identifying and minimizing handling losses, accounting for moisture losses during drying and aeration, accurately determining weights and quality parameters during receipt and delivery of the grain, monitoring quality degradation during storage, mitigating theft, and minimizing grain spillage. It also includes physically verifying the grain in stock. This is done

to check that the actual stock in the warehouse is the same as the records indicate. Some firms, banks, collateral managers etc. (Chapter 6) may require verifications to determine physical quantities.

Storage

Grain is easier to store than many other products. If it is kept free of insects, at a low moisture content and at the right temperature and relative humidity, it will keep for some years with minimal loss of quality. Warehouse operators fumigate the grain at regular intervals to control pests (see below). In humid areas, the grain may gradually pick up moisture from the air, so the operators may need to dry it again to bring it below the required moisture content. However, mostly they control this by aerating the grain when the relative humidity is below 65%. The operator needs to check the grain regularly for temperature, moisture content and insect infestation (usually every 2 weeks). Commercial warehouses maintain a laboratory to conduct these checks.

Pest management

Pest management is vital to maintain the quality of grain. It starts when the depositor delivers a consignment of grain. At this time the warehouse operator eradicates any pests (or makes sure they are below an acceptable threshold) by physical treatment (e.g., drying the grain) or chemical means (e.g., fumigation). To choose the best method, the warehouse operator must identify the pests in the grain. Afterwards, the operator must monitor the grain to make sure the control has been effective. Some warehouse operators may require the depositor to deliver grain free from pest infestation, and may reject any grain that is infested.

Most commercial warehouses use mixed pest management. This involves using several methods (both physical and chemical) to keep pests at acceptable levels. The choice of methods depends on how long the grain will remain in storage. Some of the methods used merely reduce the incidence of pest infestation. These include good sanitation (hygiene) and grain-receiving procedures and processes. The warehouse operator samples the grain periodically to decide when and how to treat it. The idea is to keep the cost of managing pests lower than the loss of market value they cause. Most facilities aim at reducing the reliance on chemical interventions: these are used as a last resort.

Bag storage

Grain can be stored in bags or in bulk. Bag storage is more common in small- and medium-capacity commercial warehouses. Commercial operators stack bags on wooden or plastic pallets to prevent the grain from getting damp and to make it easier to manage pests. Bag storage requires the bags to be stacked, restacked, loaded and unloaded for operations such as drying and

pest control. Fumigation also tends to be more difficult in bag storage than in bulk facilities. These things tend to make bag storage more expensive and labour-intensive than bulk storage.

Piling the bags properly in stacks makes it possible to easily:

- Count the bags when verifying the physical stocks.
- Control pests by covering the stacks with a tarpaulin after applying a fumigant.
- Aerate the grain by leaving gaps between the stacks.
- Receive and dispatch grain.
- Store the maximum amount of grain while leaving gangways between and around the stacks to allow the warehouse to be cleaned and the stock to be inspected.

The stacks must not be too high: they must allow workers to move about on top of them, and be stable so they do not fall over and injure someone or spill the grain.

Bulk storage

Bulk storage involves keeping grain without packaging in a storage structure such as a silo, underground storage or flat store. Bulk storage is more common in large warehouses. It normally involves mixing grain of the same grade and variety (or some other categorization) from several different depositors.

Identity-preserved versus commingled storage

Identity-preserved storage means keeping the grain of each depositor or of a certain type (such as grain from a non-genetically modified variety) separate from the other grain in the warehouse. For example, a cooperative may deliver grain to a warehouse and ask that its identity be preserved. The grain is put in its own silo (or is stacked in bags separately from consignments from other depositors). If the grain does not fill the silo or the number of bags does not permit a stack up to the maximum permitted height, the extra capacity goes to waste. That is why warehouse operators usually charge more to preserve the identity of grain.

Why should depositors want the identity of their grain preserved? After all, one bag of Grade 1 yellow dent maize is the same as any other. But in practice, depositors may want the identity preserved for various reasons:

- It may be required by their contract.
- They may want to use their own grain for seed.
- They may have grain of a particular quality (such as organic) that they do not want mixed with grain from other sources.

Commingled storage involves putting grain with similar characteristics into the same silo or storage structure. Grade 1 grain from various farmers all goes into the Grade 1 silo or stack, while Grade 2 grain goes into another silo or stack.

This means that the individual depositor's grain loses its identity. When the depositor withdraws the grain, he or she gets the quantity, grade and variety he or she brought in, but not the exact same grain.

Dispatch of the grain

The warehouse may require the grain owners to give prior notice of when they want to collect the grain. This is because the warehouse deals with a number of customers and has to plan how to serve them. For security reasons, the warehouse may also need to know the quantity of grain, who is authorized to pick it up, and the vehicle they will use.

The grain dispatched should meet the specifications in the warehouse contract that the depositor and warehouse operator signed. For example, if the contract says "1,000 kg of Grade 1 yellow dent maize", the warehouse operator must provide exactly this to the depositor, minus any allowable deductions due to moisture changes, allowable losses, etc. (see below).

If the warehouse operator returns too little grain, or the wrong quality, the depositor may make a complaint, requiring the operator to correct the mistake or compensate for the loss.

Storage losses

Commercial warehouses have to take care of the grain in their custody. Losing or spoiling a customer's grain is a big problem. Many things can go wrong even with the most diligent warehouse operator. The warehouse may be flooded or catch fire. It may be damaged in a storm and the grain may get wet. Thieves may break in, or employees may fiddle the records or try to benefit some dubious customers.

Various losses may occur during storage in a warehouse. Some are avoidable; others are unavoidable:

- **Avoidable losses** result from improper handling of the grain. Examples are over-drying, pest damage, loss in viability, theft, spillages, flooding, contamination, and using un-calibrated equipment. Warehouse operators should compensate depositors for any avoidable losses.
- **Unavoidable losses** result from making the grain ready for safe storage. Examples are moisture loss due to drying, and the removal of foreign

matter and broken grains. Warehouse operators do not have to compensate depositors for unavoidable losses.

Normally, commercial storage service providers are allowed a further 0.5% to 2% handling losses. These are to be expected since machines are not 100% efficient. They should be stated clearly on the handling contract, and the depositor must be made aware of them.

We can also categorize losses into four types: physical, quality, biological and nutritional (Table 3).

TABLE 3. TYPES OF LOSSES DURING STORAGE

	Avoidable	Unavoidable
Caused by	Poor management	Making the grain ready for safe storage
Physical losses Loss in grain weight	Insect infestation Spillage Theft, fraud Poor security and stock control Fire, natural disasters Human error	Moisture loss due to drying Removal of dust and broken grain
Quality losses Loss in grain quality	Acceptance of poor grain on arrival Poor storage conditions Grain respiration Insect and mould attacks Drying Flooding Contamination	Loss in quality of grain stored for a long time (e.g., more than 1 year)
Biological losses Loss in viability or germinating capacity	Overheating during drying Grain respiration Insect and mould attacks Fumigants	
Nutritional losses Loss in nutritional value of the grain	Pest damage	
Handling losses Loss in weight due to handling	Faulty equipment Improper handling	Even well-maintained equipment is not 100% efficient 0.5–2% allowable (check the warehouse contract)

Physical losses
These are losses in the weight of the grain. They may be avoidable or unavoidable:

- Moisture loss due to drying, and the removal of dust and broken grains through cleaning and conveying operations are unavoidable losses.
- Weight loss due to insect infestation and theft is avoidable.

Some types of losses are apparent rather than real. The most common causes are improper weighing of the grain, or inaccurate determination of moisture or rubbish content. These may be caused by defective or inaccurate equipment, or by human error. Fraudulent employees may record the wrong weight and collude with grain depositors. All these things cause the warehouse records to be wrong. Such problems are common in the grain industry, and warehouse operators must guard against them.

BOX 11. EDUCATING FARMERS ABOUT WAREHOUSING

It is important for warehouse operators to educate farmers about the likelihood of losses during storage.

The most frequent complaint is that farmers deposit a certain weight of grain (say, 1,000 kg), and are angry when the warehouse operator returns less than this (say, 950 kg). The warehouse operator must be able to explain the reason for the difference: moisture loss, removal of dirt, handling losses, etc.

In addition, the contract must specify the allowable amount of handling losses. When they understand these issues, most farmers readily accept the explanation.

Quality losses
These are mostly avoidable losses.

They are generally caused by grain respiration, moulds and insects. They can result in high protein and uric acid content, toxins, off-flavours, insect excrement, and fragments in the grain (and the end product). Drying may also cause a loss in the milling quality of the grain. If a warehouse operator does his or her work well, these problems will not occur.

Grain inspectors may downgrade grain damaged by mould and insects, and may classify it as unfit for food or feed. Millers may pay less for grain that has heat damage.

Quality losses are, however, unavoidable when grain is stored for a long time. For this reason, some commercial warehouses downgrade grain by one grade for every year the grain remains in storage.

Biological losses
These are mostly avoidable.

An example is the loss in the viability or germinating capacity of grain meant for seed or beer brewing. This is normally caused by heating the grain above 43°C during drying. It may also occur if the grain is harvested with a high moisture content and is not dried promptly: respiration may heat up the grain and damage the germ.

Grains may also lose their viability due to insect and mould attacks. Some fumigants, such as methyl bromide, destroy the viability of seeds.

Nutritional losses
These are avoidable losses.

In commercial storage, nutritional loss is normally caused by pest damage. Grain that is damaged by insects is less nutritious than whole grain because the pests feed on the germ and endosperm, the most nutritious parts of the grain.

Other risks

Warehouse operators also have to deal with various other types of risks:

- **Disputes** arising from non-delivery of grain, non-payment for grain delivered, errors and omissions, and disagreements over ownership of the grain.
- **Market-related risks**, such as uncertainty about access to the market, including inability to find a buyer and lack of market information, and price risk (such as prices falling instead of rising as expected).
- **Policy-related risks**, such as import and export bans and subsidies that disrupt normal prices.

Managing risks

These risks, and the costs of running the warehouse, push up the costs of warehousing. Warehouse operators must try to avoid all these problems but

still reduce costs where possible. They should analyse the risks and decide how to manage them. Here are some ways they can do this.

Take normal precautions
The warehouse operator takes normal precautions to reduce the risks. Some examples:

- Use properly calibrated equipment.
- Have storage facilities inspected and approved.
- Hire competent, well-trained and motivated staff.
- Have robust internal control and monitoring procedures, such as unannounced physical stock audits.

Prepare a disaster-management plan
This contains all possible scenarios that might compromise the firm's operation, and describes how to avoid them. One possible risk at times of food shortage is that national or local government bodies may decide to seize stocks of grain for "food security" reasons, or to control its price. When prices rise, traders and millers are often, misguidedly, accused of "hoarding". If stocks are seized, the allocation of loss is important. Does it represent "force majeure" with no blame attached to the warehouse company? Should the loss be shared? Who takes responsibility for legal action for the return of the grain?

Take out insurance
Warehouse operators should have insurance to cover them in the event of a problem, and potential depositors should confirm the warehouse has such insurance. Common forms of insurance cover the operator against:

- **Fire, flood,** etc.
- **Theft.** This covers theft of grain from the warehouse by other parties than the employees.
- **Misperformance,** whether due to incompetence or fraud, of the warehouse operator's staff. It should also cover fraud by the top management.
- **Political risk and terrorism.** Standard insurance excludes risks arising from politics, sabotage and terrorism. Separate cover is needed for these risks.

Get certified
The other parties (depositors, banks, buyers and sellers) in grain transactions want to be confident that the warehouse is trustworthy, professionally managed and financially secure. Some countries have a certification scheme, where a government or independent agency inspects warehouses and gives them a certificate.

Certification is usually a requirement for a warehouse to participate in a warehouse receipt scheme (see Chapter 6).

Keep workers safe

Commercial storage providers have to operate in a safe environment. In addition to the normal workplace hazards, they also face special types of risks. A dust explosion or fire, for example, can cause injuries and deaths, and can render a company bankrupt very quickly.

Injuries in the workplace may result in the company being held liable for huge sums in compensation, and the firm may be shut down if it has a poor safety record. Warehouses and grain-handling facilities must maintain safe working procedures to reduce such hazards.

Commercial warehousing in structured trade

Commercial storage is an important part of structured trade. Unlike on-farm, village or cooperative stores where farmers store grains for themselves, commercial storage providers have no direct interest in the grain other than the handling and storage charges. This puts them in a position where they can act as **collateral managers** (see Chapter 6). In this position, they can guarantee the quality and quantity of the grain in the store and can hold grain on behalf of a financier or buyer. Plus, they offer professional services.

Keeping grain in a commercial warehouse minimizes the risk for commodity financiers and buyers, and puts warehouse operators in a unique position in structured trade systems. Such warehouses make it possible for farmers, traders and buyers to transfer ownership of the grain without having to move it. This makes warehouse receipt systems (Chapter 6) and commodity exchanges (Chapter 7) possible.

Warehouses used in warehouse receipt systems may be **private** or **public**.

Private warehouses

A private warehouse is controlled privately by:

- A trader to store goods for its trading activities
- A group of farmers to store their goods prior to sale
- A processor to store raw materials or finished goods, or
- A wholesaler to manage inventory.

The main business of the controlling company is not warehousing but production, manufacturing, wholesaling or retailing.

From a bank's point of view, the big disadvantage of private warehouses is security. The bank has no way of knowing that the grain is in fact in the warehouse. The warehouse owner may take the grain away without asking or even informing the bank. Plus, the bank cannot be sure of getting the grain if the borrower defaults on a loan. That makes the bank reluctant to lend money to the owner of grain in a private warehouse.

The solution? Convert the private warehouse into a public warehouse, by putting it under the control of a **collateral management company** (see Chapter 6).

Public warehouses (commercial warehouses)
The title "public warehouse" does not mean that the warehouse is managed by the government. Rather, it is a warehouse that is open to the public: anyone can deposit grain there. It is operated by a warehousing company which does not own the grain stored in it. The warehousing company provides a service for a set fee.

It is much easier to establish that **bailment** (Box 14, Chapter 6) exists in a public warehouse than in a private warehouse.

There are two types of public warehouses: terminal warehouse and field warehouse.

- **Terminal warehouse.** A terminal warehouse, or commercial warehouse, is physically separate from the company that owns the grain stored in it. Most terminal warehouses store grain from many different depositors.
- **Field warehouse.** A field warehouse is a private warehouse that is under collateral management. It is located at or near the company that owns the grain stored in it. The collateral manager takes control of the warehouse and its contents, so creating a legally independent facility.

5 Market information

Structured trading requires a wide range of information. A system that provides this information in a convenient way is a key part of structured trading: it gives the actors in the chain the information they need to buy and sell the right crops at the right time and at the right price.

This chapter describes the different types of market information, explains the information used in structured trading, and lists the elements that users should pay attention to. It ends with a description of a few examples of how private and public market information systems are used in structured grain trading in Africa.

The simplest form of market information is word of mouth. When a farmer negotiates with a trader, he or she finds out what price the trader is willing to offer. The farmer tells his or her friends and neighbours. They can decide whether to sell their grain to that trader, or whether to wait for a better offer from someone else.

Similarly, traders also talk to each other and their agents. They watch what their competitors are doing. So, too, do all the other actors in the chain.

Such traditional systems may be good enough for local markets. But they are not enough for a structured trading system. Those working in more formal trading systems need information that is better organized, more reliable, and more transparent:

- **Farmers** need information to decide when and where to sell their grain, whether to first store it in a warehouse, whom to sell it to, and what crop to plant next season.
- **Traders** need to decide whether to buy a commodity, whether to store it or sell it immediately, and who to buy from or sell to.
- **Buyers and sellers** need information on prices and the stocks of each

product and grade in the various markets and warehouses. They also need a good understanding of market trends and dynamics. Is the price going up or down? What will it be in three or six months' time?
- **Bankers** need information so they can decide how much they can lend against the collateral of stock in a warehouse. If they lend too much and market prices collapse, they run the risk that they will not be fully repaid for the value of the loan.

What is a market information system?

A **market information system** collects, analyses, packages, stores and disseminates prices and other information relevant to farmers, traders, processors and others involved in handling agricultural commodities. It may also be called a market intelligence system, market information service or, in short, an MIS.

In Africa, market information systems usually focus on prices (farm gate, wholesale, retail) for each commodity, grade and market, and on the stocks or quantities of these commodities. Some systems also cover transport costs, imports and exports, cross-border trade, parity prices, national and regional food-balance sheets, etc. The MIS may offer market reports and charts. Some may be available for free, on payment of a fee for a specific piece of information, or on subscription.

Some systems also maintain electronic trading platforms where buyers and sellers can place bids and offers.

Examples of market information systems

There are many types of market information system in Africa. Some of these are described in Table 4.

Some market information systems serve **several countries** or a whole region: they include RESIMAO, Esoko and EAGC RATIN.

Most MIS serve a **single country**. Some small ones are run just in local markets or in one province. They vary considerably from country to country. Some are run by public agencies or NGOs, but an increasing number are now managed by farmers' organizations and private businesses. Examples are those run by Infotrade Uganda, the Kenya Agricultural Commodity Exchange, and the Zambia National Farmers Union.

In a few countries where **commodity exchanges** operate, a market information system is a vital part of the exchange. Its information is generated as a result of

trades conducted on the exchange as well as the prices that are bid and offered on the trading platform. It provides real-time price information (see Chapter 7).

TABLE 4. EXAMPLES OF MARKET INFORMATION SERVICES IN AFRICA

Serving several countries or a region	
RESIMAO Réseau des Systèmes d'Information des Marchés en Afrique de l'Ouest (West African Market Information Network) www.resimao.org	A network of market information systems from Benin, Burkina Faso, Côte d'Ivoire, Guinea, Niger, Mali, Senegal, Togo, Nigeria and Guinea-Bissau.
Esoko www.esoko.com	A private-sector initiative that provides market information via the Internet and mobile phones. Serves West and East Africa.
EAGC RATIN Regional Agricultural Trade Intelligence Network www.ratin.net	A regional organization operating in six countries that offers structured information to its members. It uses both web-based and mobile techniques. It is a service of the Eastern Africa Grain Council.
Serving a single country	
Infotrade Uganda www.infotradeuganda.com	An integrated market information service that collects, integrates and disseminates information using mobile, web, radio and traditional channels. It offers both free and subscription services.
Kenya Agricultural Commodity Exchange (KACE) www.kacekenya.co.ke	Launched in 1997, KACE facilitates trade in agricultural commodities, provides marketing information and intelligence, and offers a transparent and competitive market price discovery mechanism.
South African Grain Information Service (SAGIS) www.sagis.org.za	Market information on white and yellow maize, oilseeds (sunflower, soybeans, canola and groundnuts), winter cereals (wheat, barley and oats), and sorghum.
Zambia National Farmers Union (ZNFU) www.farmprices.co.zm	Allows traders to upload information about the products and quantities they want to buy. Farmers can access this information by web and SMS, and negotiate with buyers by SMS.
Commodity exchanges providing price information	
Agricultural Commodity Exchange for Africa, Malawi (ACE) www.aceafrica.org.	Provides market price information for maize, groundnuts, soybeans, cowpeas, pigeonpeas and sunflower.
Ethiopian Commodity Exchange (ECX) www.ecx.com.et	Focuses mainly on coffee, but also provides information on maize, wheat, oilseeds and beans.
SAFEX www.safex.co.za	An agricultural futures exchange that is now part of the Johannesburg Stock Exchange. Provides information on prices of daily trades of beans, maize, sorghum, soya and other products.

For a more complete list of market information systems in Africa, see www.sim2g.org/mis_network/mis_s_list.

Other sources of market information

Over time, farmers, traders, processors and others develop both informal and formal sources of market information. We have already mentioned one: talking to friends, neighbours, trading partners and competitors. Other informal and formal methods include notice boards in markets, newspapers, radio, television and the internet (Table 5, Figure 19). Mobile phones are an increasingly important distribution method for MIS (Box 12).

TABLE 5. DELIVERY CHANNELS FOR MARKET INFORMATION

People-based	Electronic	Print
Development field staff	FM radio	Newsletters
Contact farmers	Television	Public noticeboards
School teachers	Internet	Newspapers
Private-sector agribusiness	SMS via mobile phones	Posters
Extension workers	Email	Pamphlets
	Village information booths	
	Web business tools	

Figure 19. Print as a distribution channel: information about groundnuts from Infotrade in Uganda

Some types of information are part of organized market information systems; others are more haphazard. The new delivery models complement the traditional systems, and many actors combine information from various sources. In some cases users can also cross-check the information from different MIS.

Other information sources include government bureaux of statistics, customs agencies, national statistics bodies, and international business information sources such as Reuters. However, most government sources tend to provide information that is rather out of date, while subscriptions to international services can be very expensive, particularly for farmers and small traders.

BOX 12. USING MOBILE PHONES TO GET MARKET INFORMATION

In many countries, people increasingly use their mobile phones to get the latest information. There are two main types of scheme:

- **"Push" systems.** This is when someone subscribes to a service, and it will automatically send the subscriber information in the form of short messages (SMS). This is called a "push" system because it "pushes" information out to the subscriber without him or her having to do anything.
- **"Pull" systems.** A user can send an SMS to a particular number, and the service will reply with the information wanted. The user can use a smartphone to visit a website to get the information. This is called a "pull" system because the user has to do something (send an SMS, visit the website) to "pull" the information to his or her device.

Of course, mobile phones also let people call their traders, millers, friends and other contacts in different towns to ask about local prices and market trends. Such personal networks are a vital part of an informal market information system.

In addition to mobile phones, farmers and traders also can use call-back centres or toll-free lines to verify or ask for market information from providers.

What market information can be used in structured trading?

Market information systems provide a wide range of information that can be used at every stage of the chain (Figure 20).

Structured trading systems need market information once the grain has been harvested, cleaned, graded and stored in a warehouse. That is when trading decisions have to be made. However, farmers also need information to decide whether to store or sell their grains, as well as to make longer-term decisions on what to grow and when to grow it.

Being able to monitor market prices is a key aspect of the warehouse receipt system, a central component of structured trading (Chapter 6). If the information is not there, or if it is not reliable, the whole operation will fail. The depositors could lose money.

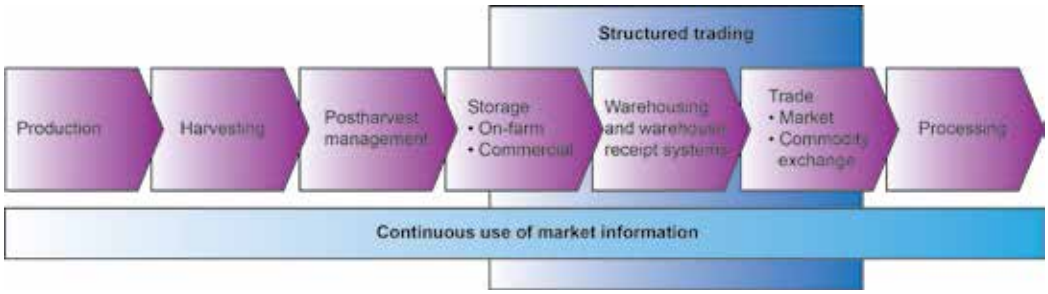


Figure 20. Market information systems are used throughout the value chain – and especially in structured trading systems

Table 6 shows the information that users such as farmers, traders and financial institutions need in a structured trading system. Market information systems provide some of this information. The rest may come from other sources.

TABLE 6. TYPES OF MARKET INFORMATION NEEDED IN STRUCTURED TRADING

Stage of structured trading	Market information required	Other information required
Warehousing and warehouse receipt system	Daily market prices (farm gate, wholesale, retail) for each commodity, grade and market Price trends (annual, quarterly, monthly and weekly) Volumes available in each market and region (including reserve stocks) Transport costs Food balance sheets	Grades and standards requirements List of certified/registered warehouses Interest rates charged by financial institutions involved in warehouse receipt systems Storage and warehousing fees Real-time information on warehouses' stock levels Insurance premium Warehouse receipt and financial regulations Trade policies and regulations List of buyers Profiles of buyers and traders
Trading and commodity exchange	Spot market and future prices Warehouse stocks Import and export data Import parity prices Regional price comparison Volume of trade Commodity trade flows	International market trends Delivery models and approval channels. Commodity inspection

Updated, reliable, comprehensive and neutral...

Market information services must provide information that is up-to-date, reliable, comprehensive and neutral. Farmers or traders want information that will help them to make the right decision at the right moment. So, timely, frequent updates are very important.

How is the information gathered? Most market information systems have various ways to collect data. Some are reliable and accurate; others less so. The systems also need to check and analyse the data in a consistent way. The information must be neutral. Information can be easily manipulated, and grain prices in some countries can be very political. The provider of the information must be able to guarantee its neutrality, and it must be presented in a way that is clear for all to understand.

Users of information are at liberty to compare different sources of information. If there is more than one information provider, users often check different sources. Some national and regional information providers are trying to harmonize the collection, analysis and packaging of information in a bid to standardize how market information is provided.

Two market information systems used for structured grain trading in Africa

SAGIS: South African Grain Information Service, South Africa
www.sagis.org.za

SAGIS was founded in November 1997, after the deregulation of agriculture in South Africa.

It covers four groups of commodities:

- Maize (white and yellow separately)
- Oilseeds (sunflower, soybeans, canola and groundnuts)
- Winter cereals (wheat, barley and oats)
- Sorghum.

SAGIS gathers, processes, analyses and distributes information on these commodities to interested parties. It ensures that the information is reliable and timely. Market participants (such as warehouse operators, traders with their own premises, processors, importers and exporters) are legally required to register with SAGIS and to provide it with information.

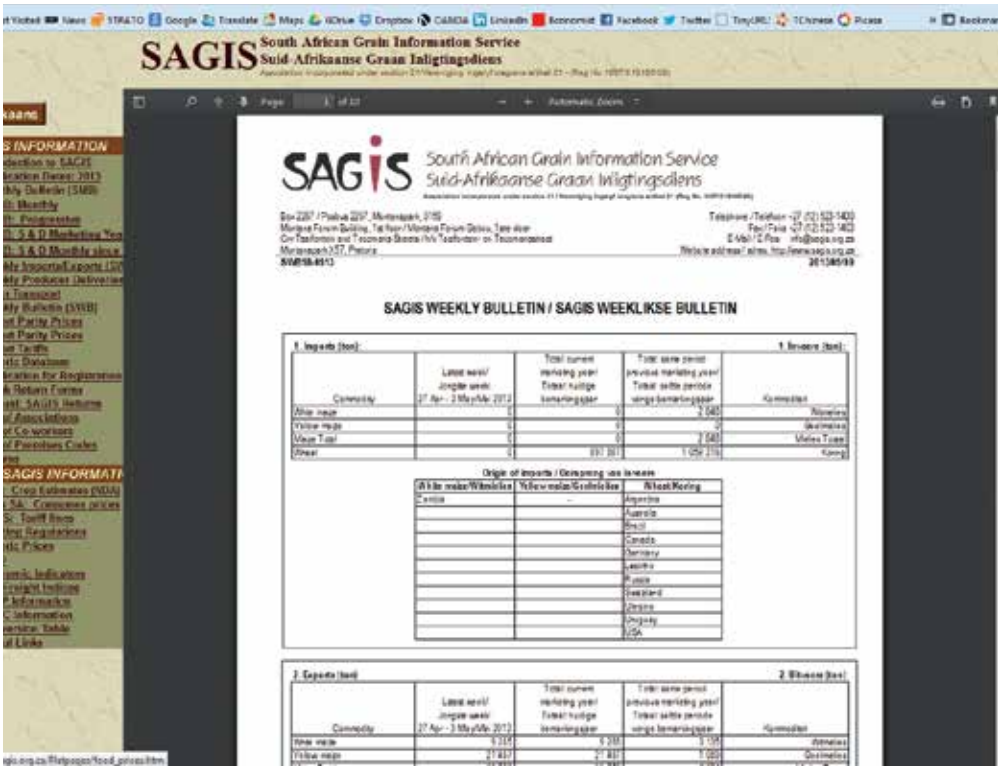


Figure 21. SAGIS provides weekly bulletins

SAGIS releases the following information:

- **Monthly supply and demand tables:** One page per commodity, with stocks, producer deliveries, imports, exports and consumption.
- **Weekly bulletins:** A collection of local and international information such as prices, stocks, import parity prices, economic indicators, food prices and weather conditions.
- **Weekly imports and exports** for maize and wheat.
- **Weekly producer deliveries** for maize and wheat.

The monthly and weekly bulletins are sent to a distribution list and published on the SAGIS website. People on the distribution list get the bulletins by email, fax or ordinary post. SAGIS is funded by trusts set up by the four commodity sectors. It provides information free of charge. SAGIS also provides training for other countries seeking to set up similar operations, particularly in the Southern African Development Community region.

EAGC RATIN: Regional Agricultural Trade Intelligence Network, East Africa
www.ratin.net

RATIN is a regional market information system developed and hosted by the Eastern Africa Grain Council (EAGC). It is a one-stop-shop for timely, accurate, and relevant market information for grain stakeholders in East Africa. Its services include daily market prices, daily cross-border trade flows, real-time warehouse stocks, regional food-balance sheets, parity prices, grain trade news updates, weekly market analysis reports, monthly cross-border reports, daily news updates, interactive maps and historical datasets.

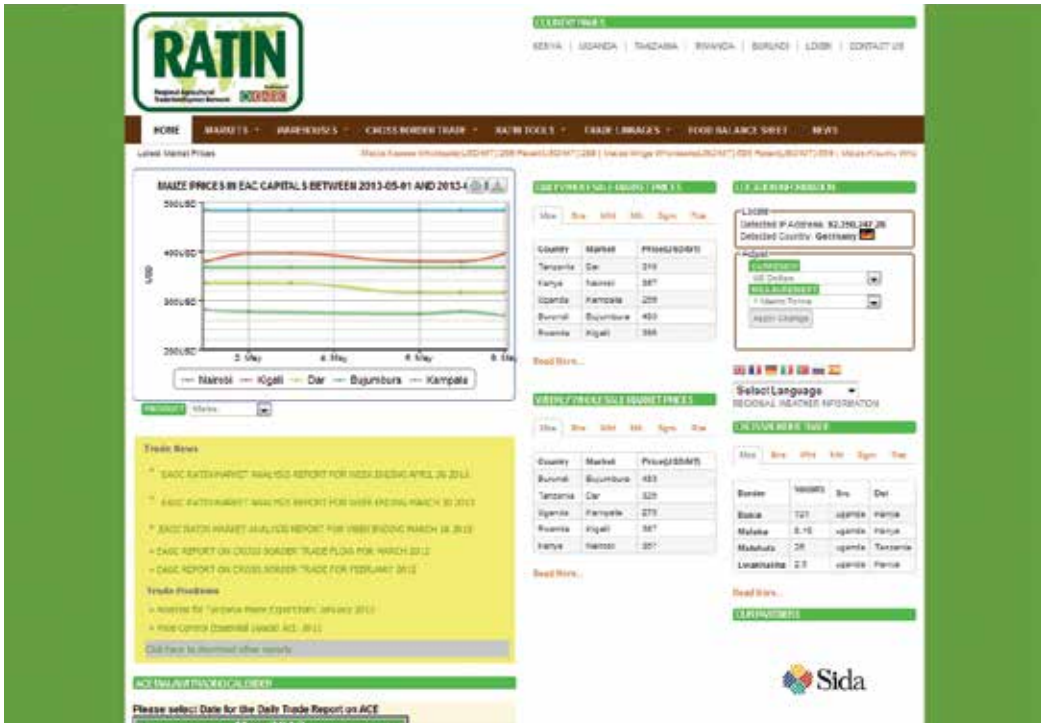


Figure 22. RATIN lists prices in Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda

RATIN's information is collected by enumerators based at the main markets, border points, warehouses, and at food balance sheet committees. They use smartphones to collect and transmit the data. The information is relayed to a central database where it is processed, analysed and disseminated through the RATIN web portal, SMS services, email and newspapers.

RATIN delivers market information to end users via three types of channels: people-based, electronic, and print media (Table 6). Users can choose the channel they prefer, depending on convenience and cost. The most important channels are radio, mobile phones and the internet.

6 Warehouse

receipts and collateral management

The XYZ farmers' group has harvested 100 tons of maize and dried it in the sun. They know that the price immediately after harvest is low. They realize that if they wait a few months before selling, it is likely to be much higher.

But they need cash, now. The members have school fees to pay. They need to buy fertilizer, seed and other inputs for the next season. If they do not sell their maize immediately, they cannot buy these items. What can they do?

They bring their grain to the ABC warehouse. They want to store it there for a few months in the hope that the price will go up. The warehouse operator runs a warehouse receipt system. When the farmers deposit their grain, he will give them a warehouse receipt. The farmers can then take that receipt to a bank and use it to get a loan, which they can use to buy the inputs they need and pay for other expenses. The bank will lend them this money because it knows that the grain exists, and that the warehouse is holding it securely. If the farmers do not repay the loan, the bank can go to the warehouse with the receipt and ask the warehouse operator to sell the grain and pay the bank.

The farmer group watches the market price carefully and decides when to sell the grain. They make sure the price is high enough to cover the cost of storage, the interest on the loan, as well as some profit.

The warehouse receipt has another advantage. Once they have paid off the loan, the farmers can sell the receipt to a trader, who can go to the warehouse to claim the grain. Because the receipt shows the amount of grain and its grade, the trader knows how much the grain is worth. The farmers and trader can buy and sell the grain without having to pay for transporting it. That makes trading a lot easier for everyone.

* * *

Sounds simple? The devil is in the details. This chapter explains how warehouse receipt systems work.

Warehouse receipts

A warehouse receipt (Figure 13) is a document that proves that someone has deposited a certain amount of grain (or some other commodity) in a specific warehouse. The person who deposits the grain is called the **depositor**. This may be a farmer or group of farmers or, more usually, a processor or trader. The receipt may be single sheet of paper, or it may be in electronic form.

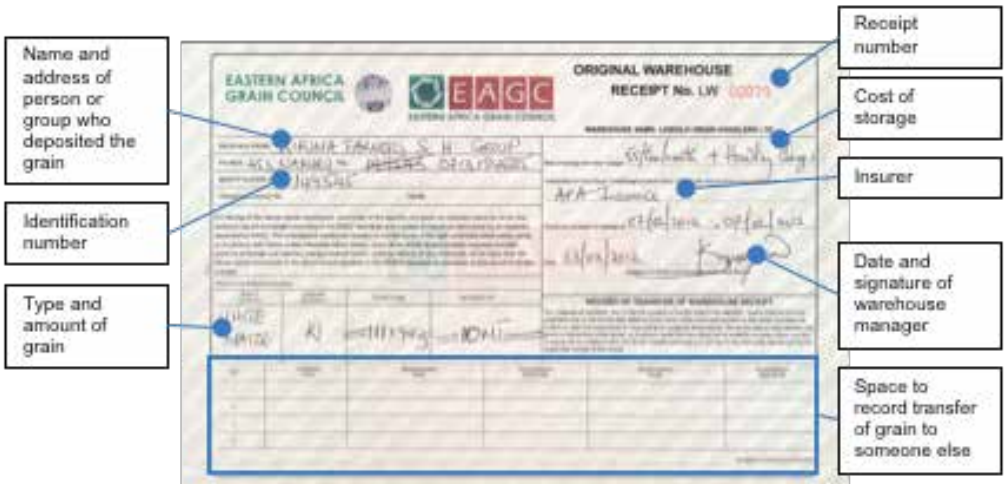


Figure 23. A warehouse receipt issued by the Eastern Africa Grain Council

BOX 13. WAREHOUSE RECEIPTS

Warehouse receipt: Proof that a certain weight, quantity and quality (grade) of grain has been deposited in a particular warehouse.

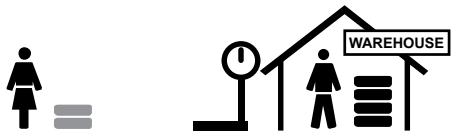
Depositor: The person or group (such as a farmer, farmers' association or trader) that puts the grain in the warehouse.

Warehouse operator: The person or company that runs the warehouse where the grain is stored, and who issues the receipt.

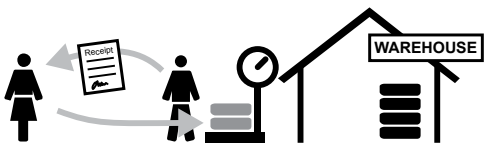
How it works

A warehouse receipt system involves various parties: the depositor of the grain, the warehouse operator, the bank (if a loan is required), and a buyer. Figure 24 shows how a simple warehouse receipt system works.

FIGURE 24. HOW A WAREHOUSE RECEIPT SYSTEM WORKS



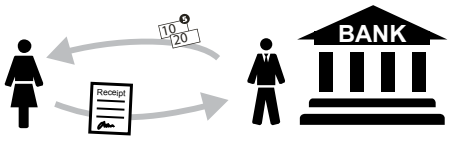
The depositor takes the grain to a warehouse.



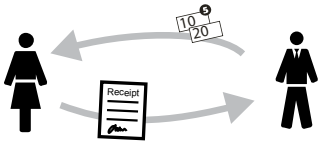
The warehouse operator weighs and tests the grain, and gives the depositor a warehouse receipt showing the weight, quantity and quality.

The warehouse operator keeps the grain safe, clean and dry, and free of pests.

OR

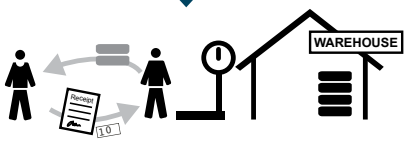


The depositor can take the warehouse receipt to a bank and use it as collateral for a loan.

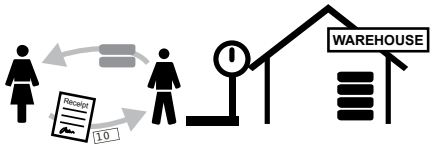


Or, if the warehouse receipt is negotiable or transferrable, the depositor can sell it to a buyer.

When the depositor has repaid the loan, the bank returns the warehouse receipt.



The buyer can then take the receipt to the warehouse, pay the storage fee, and pick up the grain.



The depositor returns the receipt to the warehouse, pays for the storage fee, and picks up the grain.

Who owns the grain?

The depositor owns the grain listed on the warehouse receipt – unless he or she sells the receipt to someone else.

The warehouse operator is not allowed to move the grain or dispose of it without the receipt holder's permission. Even if the warehouse goes bankrupt, the grain is safe because the legal title to the grain remains with the holder of the receipt.

When the depositor brings the receipt back to the warehouse, the operator must allow him or her to take the grain. If the warehouse agreement specifies it must be "identity preserved" (Chapter 4), it must be exactly the same grain.

Otherwise, it may be other grain of the same grade and quality. If for any reason the grain has been spoiled or stolen, the warehouse operator has to reimburse the depositor.

Figure 25. Warehouse receipt systems make it possible to get loans for stored grain

Using a warehouse receipt to get a loan

A depositor can use a warehouse receipt to get a loan from a bank in two ways:

- The depositor takes the receipt to the bank. The bank takes the receipt as collateral, and gives the depositor a loan. Once the loan has been repaid, the bank returns the receipt.
- The warehouse operator has an agency arrangement with the bank, and the depositor can ask him to arrange for a bank loan against the security of the receipt.

If the depositor does not repay the loan, the bank can sell the grain and get its money back.

For this system to work, the bank has to recognize that the receipts are valid as collateral, and it has to trust the warehouse receipt system and accept the risks involved. Some banks are willing to do this; others are not.

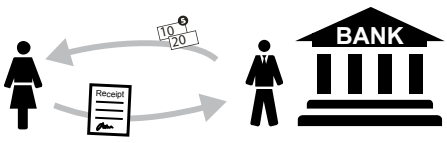
Selling the grain

The receipt holder can decide to sell the grain he or she has stored in a warehouse. For the receipt holder to make a profit, the selling price must be high enough to:

- Cover the storage costs charged by the warehouse operator, plus the loss of weight caused by drying and cleaning and while in storage.
- Cover the interest rate charged by the bank for their loan, plus the cost of making arrangements for the loan.
- Provide some profit for the depositor.

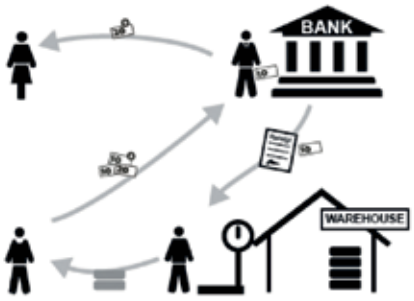
The bank may be the central point for settling the financial transactions. In that case there is a four-way relationship between the depositor, the bank, the warehouse operator and the buyer (Figure 26).

FIGURE 26. SELLING A WAREHOUSE RECEIPT THAT IS USED AS COLLATERAL FOR A LOAN



The depositor uses a warehouse receipt to get a loan from the bank.

The depositor agrees to sell the grain to a buyer



The buyer pays the bank, which deducts the interest and warehousing fees, then pays the depositor.

The bank pays the fees to the warehouse, and authorizes the warehouse to release the grain to the buyer.

The warehouse cancels the warehouse receipt and releases the grain to the buyer.

And if the price does not go up?

The price of grain does not always rise in the months after harvest. In some years it stays the same, or it may even fall. What if this happens, and the grain does not fetch as much as expected when it is sold? Here are some ways that depositors and lenders can reduce the risk of a loss:

- Banks and other lenders do not lend the full value of the warehouse receipt. Usually, a loan covers about 60% of the value of the grain at the time it is deposited in a warehouse.
- Banks and collateral managers monitor the market prices of grain carefully using available market information (see Chapter 5).
- Lending contracts permit lenders to vary the amount they lend depending on the price. They may require more collateral if the market price falls.
- Forward contracts (contracts to buy a certain amount of grain at some time in the future) may specify a minimum acceptable purchase price.

Types of warehouse receipts

There are lots of different types of warehouse receipts. Some are transferrable, meaning they can be transferred for one person or company to another. Depositors need to make sure they know what type of receipt they are getting:

- **Non-negotiable receipts.** Some types of warehouse receipts are "non-negotiable". This means the depositor him- or herself (or someone they authorize) has to go to the warehouse to pick up the grain.
- **Negotiable receipts.** Other warehouse receipts are "negotiable". The receipt document itself conveys the rights to the grain. That means the depositor can sell it to a buyer, who can then go to the warehouse to collect the grain. This is risky because someone may steal or forge a paper receipt and go to pick up the grain or take out a loan. (This problem may soon be a thing of the past as records become electronic, which allows extra safeguards to be built in.)
- **Transferrable receipts.** Other types of receipts are "transferrable". They are more restricted than the fully negotiable type above. The depositor is required to countersign it before giving it to someone else, who can then go to the warehouse to pick up the grain. The new owner must return the countersigned receipt to the warehouse operator, who cancels the original receipt and issues a new receipt in the name of the new owner.

Ideally, a country will have laws (see below) that recognize a warehouse receipt as a legal document of ownership. That gives the buyer, and the bank, confidence that the receipt represents real grain in a real warehouse. There is no need to go and check that it actually exists.

The warehouse operator

The warehouse operator has to keep the grain in a safe place, clean, dry and free of pests. He or she must return the grain to the depositor, of the same type and quality, as specified on the warehouse receipt. If the operator fails to do this, he or she has to compensate the depositor for the grain.

The depositor will get 95–98% of the weight of the grain back, depending on the length of storage and the moisture levels at time of deposit and collection. Details should be specified on the warehouse receipt. Where grain is stored in bulk, then the owner of the receipt will receive a guaranteed amount. If it is stored in bags, the same number of bags are returned but they may weigh slightly less (or more, depending on the commodity and humidity).

Why not 100%? Because every time the grain is handled (for example if it goes through cleaning equipment), some is lost. If it is dried, it loses weight. It can also lose weight over the storage period. With storage in tropical zones, however, it might actually increase in weight slightly. See Chapter 4 for details.

The depositor has to pay for the costs of storing, cleaning and drying the grain, and any other services. If the depositor does not pay, the warehouse operator can keep the grain until payment is received.

If the depositor does not pick up the grain within a reasonable period, the warehouse operator can sell the grain to pay for the unpaid expenses. The operator will then pay the remainder of the proceeds to the depositor.

Other warehouse receipt systems

Collateral management

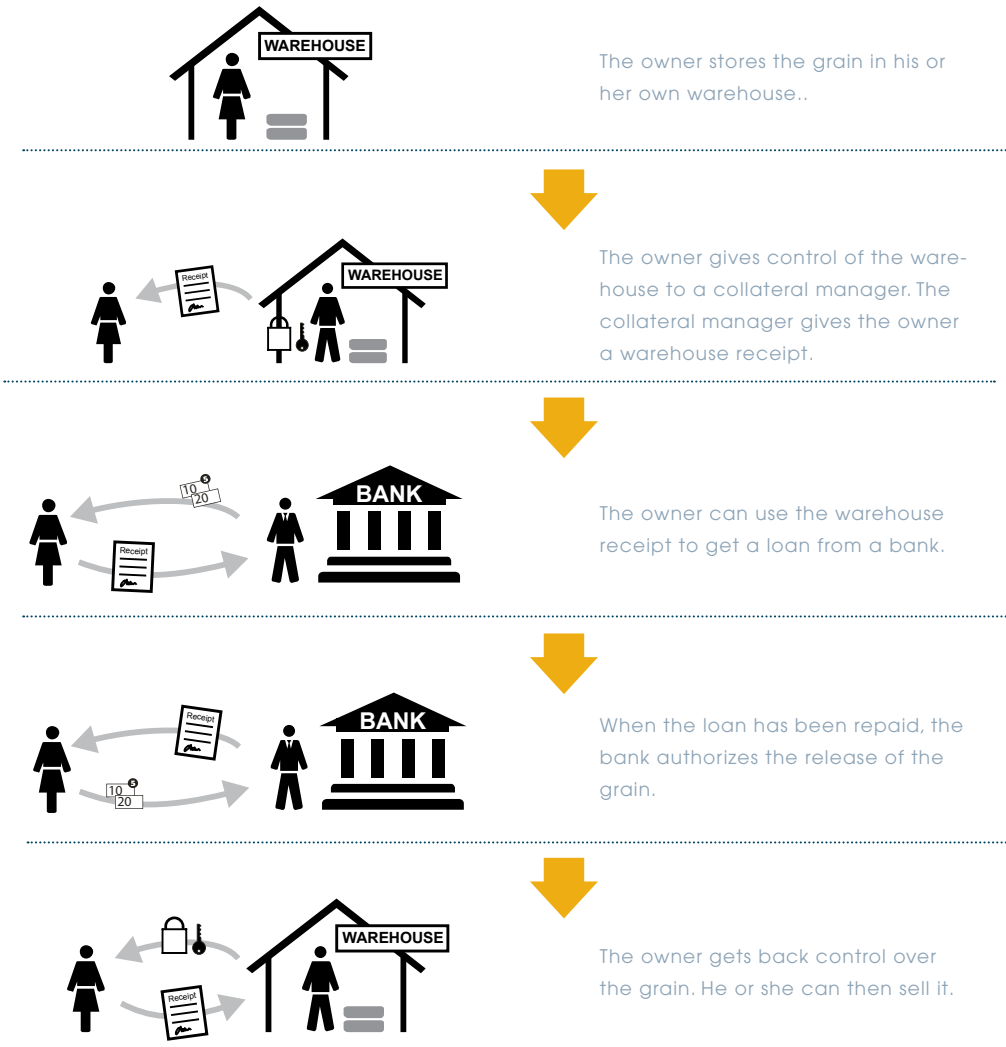
Collateral management puts the grain under the control of a trusted, independent third party – the collateral manager. The grain stays in the owner's own warehouse. But the collateral manager takes control of the warehouse and prevents the owner from disposing of the grain without permission. This is also known as "field" warehousing and storage services (see Chapter 4).

The collateral manager checks the grain, makes sure that it matches the records, then takes control of it on behalf of the owner and the lender.

There are specific requirements for this:

- The manager inspects the warehouse and makes sure it fits the requirements.
- The manager signs a lease agreement for the warehouse, taking legal control of it.

FIGURE 27. HOW COLLATERAL MANAGEMENT WORKS



- The collateral manager puts locks and seals on the warehouse to prevent anyone (including the owner) from taking grain out.
- The manager puts up notices saying who now controls the warehouse and its contents.

Warehouse receipts are fairly new in Africa, so some countries do not yet have the necessary legislation in place (though countries with ports invariably have bonded warehouses, and the stock they contain can be used as collateral). Three-way agreements between the lender, borrower and collateral manager make collateral management possible even if there is no legislation in place.

Under these agreements, the lender and borrower both agree that the collateral manager is a suitable organization to provide the service. Some countries have enacted warehousing laws, but collateral management through such three-way agreements still dominates the markets. This is because lenders in such countries are not yet confident enough in the licensed warehouse operators and regulators of the receipt systems.

Joint key holding

Some banks are prepared to lend money to longstanding, trusted customers if the grain used as collateral is stored in a warehouse belonging to the borrower. The borrower gives a key to the bank so it can check the grain at any time. This practice is used in some countries, but is rare in Africa.

BOX 14. BAILMENT

Warehouse receipt finance, including collateral management, depends on the legal concept of bailment.

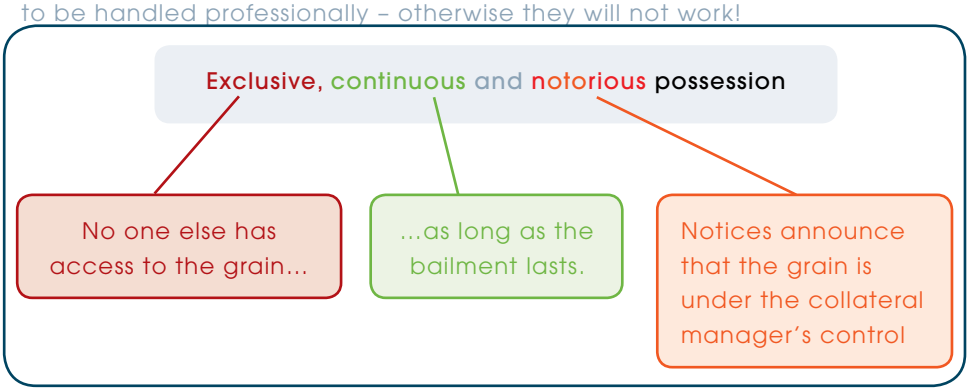
- **Bailment:** Where one person owns the property (in this case, the grain), but someone has it in his or her possession.
- **Bailer:** The person who owns the grain: the depositor.
- **Bailee:** The person who stores the grain: the collateral manager

Conditions for bailment

Two conditions are necessary for bailment to exist.

- The depositor relinquishes possession of the grain.
- The collateral manager assumes "exclusive, continuous and notorious possession" of the grain.

Sounds complicated? That is because it is not possible to do warehouse receipt finance in an amateurish or haphazard manner. These are highly structured processes and depend on the right legal conditions. They have to be handled professionally – otherwise they will not work!



In Asia, some banks will even give short-term operating credit to trusted rice traders that declare their own collateral, without any inspection.

Community cereal banks

This is where an organization (such as a farmers' group or cooperative) puts its grain in a warehouse which it manages itself. Some communities do this just so they can store their grain safely. Others do it so they can then go to a bank or microfinance institution to ask for a loan, using the grain (the inventory) as collateral. In French this is often called "warrantage".

Cereal banks were widely promoted in the Sahel in the 1970s and 1980s. They were nearly always sponsored by an outside agency, such as an NGO, which helped finance the construction of a small warehouse, often meeting material costs while villagers provided the labour. The NGO would then provide funds to the village to purchase grain after harvest when prices were low, with the plan that the grain would be sold in the village when prices increased during the lean season. The returns from these sales were intended to be used for new purchases in the following year. An estimated 4,000 such cereal banks were constructed in the Sahel, and the idea spread to countries outside that region and even outside Africa. Unfortunately, the majority failed.

This failure was because of various false assumptions and management and financial problems:

False assumptions

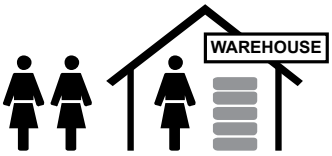
- The cereal banks were based on the assumption that farmers were forced to sell their entire crop immediately after harvest and buy back grain later in the season. Subsequent research questioned this.
- Projects to build cereal banks assumed that they would protect farmers from exploitation by traders. But in fact, it seems that grain trade in the region was very competitive, and profit margins were relatively small.
- The assumption was made that on-farm storage losses were very high. Research has also challenged this.

Management and financial problems

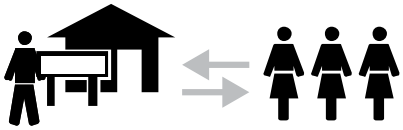
- The cereal banks could not earn enough profit to cover their costs.
- Collective decision-making proved slow and cumbersome.
- There were few incentives for management to perform.
- Banks tended to insist on a credit guarantee to cover the whole amount of the loan, because they had no guarantee that if the loan were not repaid the grain serving as the collateral would still be in the store. This guarantee was usually provided by an NGO. That meant the banks took on little or no

financing risk. But credit guarantees are hard to get, so such programmes tended to be small-scale. Plus, banks were not encouraged to find new ways of making money by lending money.

FIGURE 28. HOW COMMUNITY CEREAL BANKS WORK



The members of a farmers' organization put their grain in their warehouse.



The organization reaches an agreement with an NGO.

The NGO provides a guarantee to the bank. The bank gives the organization a loan.

The farmers repay the loan, and the bank terminates the guarantee.

If the farmers do not repay the loan, two things may happen:

The bank may claim the stored grain, or...

The NGO reimburses the bank.

Warehouse receipts and the law

Many countries have legislation that governs warehouse receipt systems. This legislation defines the rules and regulations that such systems have to follow. It protects the interests of depositors, lenders and buyers by making sure that only registered operators are allowed to issue warehouse receipts.

Effective regulations build everyone's confidence that the receipt system will work. Farmers trust that their grain is safe in the warehouse. Lenders become more willing to lend money. Buyers are happy that the grain will be handed over after they have paid for it.

Examples of regulations

- **Warehouse certification.** Certifying or licensing has to cover the warehouses, the warehouse operators and their personnel. This makes sure they meet certain requirements: they must have enough capital, they must have insurance cover for fire and other risks, and they must have a guarantee in case they fail to perform.
- **Enforcement.** A regulatory agency makes regular, unannounced inspections of the warehouse and checks that the grain is properly graded and stored.
- **Reliable receipts.** Systems and procedures ensure that receipts can be issued only by bona fide warehouse operators.
- **Compliance with standards.** The warehouse operator must make sure that the grain conforms to accepted standards. That makes buying and selling easier.
- **Central registry.** A central registry system, preferably electronic, cuts the risk of forgery, prevents duplicate receipts being issued and being "double-pledged" (the same receipt being used as collateral with two different banks).

Model warehouse legislation exists, in particular in the United States. This has guided the development of legislation in Tanzania, Uganda and other countries.

Warehouse certification

Having an official warehousing agency to certify warehouses is not essential as long as the warehouse complies with certain requirements and is fully trusted by those using its services. In the initial years of structured trade, having a certification agency may prove rather costly if only a few warehouses are seeking certification. Under these circumstances it may make sense for a country to have an agency with just one or two staff that uses the services of international inspection firms (Box 15).

The warehouse regulatory agency must have a set of rules and regulations to use for certifying and inspecting warehouses.

BOX 15. SELECTED INTERNATIONAL FIRMS THAT PROVIDE WAREHOUSE-INSPECTION SERVICES

All collateral management companies provide warehouse-inspection services. Here are some international companies that offer these services.

Audit Control and Expertise SA www.ace-group.net
Bureau Veritas: www.inspectorate.com/agricultural_services/index.asp
Drum Commodities: www.drumcommodities.com
Global Inspection: www.globalinspectionsgroup.com
SGS: www.sgs.com/en/Agriculture-Food.aspx

When a warehouse is certified:

- The warehouse operator applies to join the warehouse receipt system and pays for the inspection costs up front.
- The regulator commissions a firm to inspect the warehouse operator.
- The inspection firm does the initial inspection. It checks the warehouse buildings and equipment, staff skills, lease, records and insurance. It sends a report to the regulator.
- The regulator presents the inspection report to the warehouse operator. If the operator fails the certification, it can try to fix the deficiencies.
- A follow-up inspection is carried out to check they have been fixed.
- If the warehouse operator meets all the standards, the regulator issues a license to the warehouse operator. The warehouse is certified.

7 Agricultural commodity exchanges

"Back in the 1990s I used to buy and sell fish in the markets where I lived in Midisi, Malawi. I made good money. I invested the profits in some land, but wanted to find a way to get better prices for my other commodities, especially maize.

"I did not have any storage facilities at all, and if I had ten bags of maize I would keep them in the house, which was not a good idea because of pests. I could not find a good price for my maize anywhere. Then I looked in the telephone directory and I found the number for the Agricultural Commodity Exchange for Africa, based in Lilongwe. I spoke to them and became the first small-scale farmer to use the commodity exchange.

"I registered with ACE as a trader and put 5 tonnes of maize to sell on the exchange. Within three weeks they found me a buyer from the southern region of the country. I have now supplied the World Food Programme and used the profits to invest in a shop in Midisi. As an ACE-registered trader, I get market information through my mobile phone and it much easier for me because now I know what the market price is as well as where the maize is needed. Before, I used to sell it even if the price was low because I had to. I am very happy that I have found this system."

– Bester Mora, small-scale farmer and trader, Midisi, Malawi

* * *

Commodities stored under a warehouse receipt can easily be traded at a commodity exchange because those buying produce at an exchange can be confident that the produce exists, that it meets a specified standard, and that it belongs to the person selling it.

What is an agricultural commodity exchange?

A commodity exchange is an open and organized market place where commodities are traded. Trading is done in an organized way through a system of bids (to buy) and offers (to sell), governed by a set of rules.

A commodity exchange brings together many buyers and sellers for a given product. They make it easier for buyers and sellers to find each other and agree on prices. Because the trades are made public, they also reveal what the current market price is. This is called **price discovery**.

Agricultural commodity exchanges are the pinnacle of structured grain trading systems. They are nothing new: they have been in operation in one form or another for almost 200 years. One of the best-known exchanges is the Chicago Board of Trade, which has been functioning since 1848.

Before this, huge quantities of wheat and maize arrived in Chicago at harvest time – far more than current demand. There was not enough space to store it, and no way to stop it from deteriorating. So farmers were forced to accept whatever prices they could get before their grain spoiled and was dumped in Lake Michigan. Ironically, a few months later, the demand for grain would rise and millers would pay a premium for any grain that was still available.

As a result, both the sellers (farmers and traders) and buyers (millers) looked for a way out of the dilemma of alternating oversupply and undersupply and wide price fluctuations. This led to the creation of contracts for future delivery. A contract would specify the firm sale of a designated amount of grain "to arrive" 20, 30, or 60 days later. The farmer would harvest the grain, confident that it was already sold. The miller would be sure of having a supply of grain available throughout most of the year.

How does a commodity exchange work?

1. Alois has 100 tonnes of maize under a warehouse receipt. He wants to sell the grain at $300 per tonne. He contacts Benjamin, a broker on the exchange, with the details.
2. Benjamin registers an offer on the exchange. This specifies the quantity, grade, location and desired price of the maize.
3. Meanwhile Carol, a miller, wants to buy 150 tonnes of maize at $280 per tonne. She contacts Deidre, another broker, and asks her to arrange a purchase on the exchange.
4. Deidre looks at the various offers on the exchange, and sees the one from Benjamin. It is priced a bit higher than Carol wants to pay, and it is only 100

tonnes. But it is the right grade and the warehouse is close to Carol's mill. So Deidre places a bid for the maize at $280 a tonne.
5. Benjamin sees the bid, and calls Alois to discuss it. Alois tells Benjamin to negotiate a price between the bid and the offer.
6. Benjamin calls Deidre and says that he would accept $290 per tonne. Deidre checks with Carol, who agrees.
7. Benjamin and Deidre agree on the deal. The exchange automatically generates a contract.
8. Carol pays the agreed price to the exchange. The exchange deducts the fees for Benjamin and Deidre, as well as a handling charge. It instructs the warehouse to transfer the ownership of the grain to Carol. It then pays Alois.
9. The exchange announces the quantity and type of grain traded, and the price agreed. That lets other buyers and sellers know what they can expect to pay or get for a similar consignment of grain.

Explaining exchange jargon

Trading on commodity exchanges can be very technical (though many exchanges operate websites that make it easy for newcomers). Here are some of the terms you need to know.

Brokers and traders

Only **members** of the exchange are allowed to trade on it. They must be a reputable individual or company, and pay an annual fee. They may also have to deposit a performance bond. There are two types of members: brokers and traders. These terms are often confused, but they have a special meaning in commodity exchanges.

- A **trader** is someone who buys and sells on his or her own behalf. Traders try to make a profit by buying cheap and selling at a higher price. The traders do not have to say how much profit they are making. They may never take physical delivery of any of the products traded as they can "offset" purchases with sales.
- A **broker** is someone who conducts business on the exchange on behalf of a client (a **buyer** or **seller**). Brokers act only on the client's behalf, and have no direct interest in the deal. They charge an agreed level of commission for the services they provide to the client in finalizing the contract.

Many people want to buy or sell grain but are not members of the exchange. A broker can offer such clients various advantages:

- **Credibility** with buyers or sellers. The client might otherwise find it difficult to do business with them.

- **Specialized advice** on how and when to approach the market.
- **Increased market opportunities**, often in areas not otherwise open to the client.
- **Price and other market information** from a range of sources and places.
- **Market analysis**.

Bids and offers

- **Bid = I want to buy.** A bid placed on an exchange indicates an intention to buy. It usually indicates both the price and the quantity the buyer would like to purchase.
- **Offer = I want to sell.** An offer indicates an intention to sell. It usually indicates both the price and the quantity the seller would like to sell.

Spot, forward and future contracts

Commodity exchanges trade a variety of different contracts. The three main types in Africa are:

- **Spot contracts = we agree to buy/sell now.** These are contracts where the ownership of the grain changes hands immediately. Spot trades make it possible for a brewer, for example, to buy grain that he or she needs to start turning into beer tomorrow.
- **Forward contracts = we agree to buy/sell in the future.** These are contracts for grain to be delivered on a specified date in the future. They make it possible for a brewery, for example, to plan ahead: it knows it will need grain next September and wants to make sure it will be available. A forward contract also locks in the price to be paid. That means that both the brewer and the seller know exactly how much the grain will cost. Forward contracts allow farmers or traders to guarantee that they will get a certain price for their grain, regardless of what the actual market price is at the time.
- **Futures contracts.** These are like forward contracts, but are standardized (for 50 or 100 tonnes, for example), and for delivery in specific months. Such contracts can be traded many times without physical delivery ever actually taking place.

See Chapter 8 for more on contracts.

Call and put options

On some exchanges it is also possible to buy and sell **options**: the right (but not the obligation) to buy or sell grain at a certain date in the future.

- **Call option = I have the right to buy from you.** A call option is the right to buy a certain amount of grain from the seller on a particular date in the future, at a particular price (Box 16).

BOX 16. EXAMPLE OF A CALL OPTION

12 July	I purchase a call option from you to buy 100 tonnes of sorghum from you on 3 December at $300/tonne.
3 December	The spot price for sorghum on this day is $350/tonne. I decide to exercise the option and actually buy the grain from you at $300/tonne. You are contractually obliged to sell it to me at this price. I make a profit of $50/tonne. If the spot price is lower, say only $250/tonne, I am not obliged to exercise the option. I do not have to buy the grain at $300. I will lose only the cost of organizing the option on the exchange.

- **Put option = I have the right to sell to you.** A put option is the opposite of a call option: it is the right to sell the grain to the buyer of the option on a particular date, at a particular price (Box 17).

BOX 17. EXAMPLE OF A PUT OPTION

1 August	I purchase a put option from you to sell you 50 tonnes of soybeans on 12 February at $500/tonne.
12 February	The spot price for soybean on this day is only $480/tonne. I decide to exercise the option and sell you the soybean at $500/tonne. You are contractually obliged to buy from me at this price. I make a profit of $20/tonne. If the spot price is higher, say $550/tonne, I am not obliged to exercise the option. I do not have to sell you the grain at $500. I will lose only the cost of the option.

Open outcry and electronic trading

- In **open outcry** trading, the brokers or traders meet on the trading floor and shout (or use hand signals) to communicate what they want to buy or sell, and at what price. Open outcry exchanges are very noisy places!
- In **electronic trading**, all this is done by computers. The computer matches buyers and sellers and generates the contracts for the parties to sign.

Benefits of trading on an exchange

There are many benefits to be gained from trading through an agricultural commodity exchange. Here are some of them:

- **Lower risk.** Exchanges reduce the risks for all parties. The buyers are confident that the grain actually exists and is what the seller says it is. The sellers are confident that they will get paid.
- **Integrity.** The rules and regulations of the exchange govern how deals are transacted. This makes it possible to monitor the integrity of both the traders and brokers. The exchange ensures that quality standards are maintained for both the commodities and the trading practices.
- **Transparency.** All the deals are transparent. Prices are announced on the exchange's website and in the news media, and the transaction costs are transparent to both the buyer and seller. Where large quantities are traded on the exchange, this ensures that both sellers and buyers know they are getting the best price available at the time. However, if the exchange handles only small quantities, this cannot be guaranteed. On some exchanges these are indicated as "special trades" and are not necessarily indicative of the prevailing market prices.
- **Price discovery.** Grain prices go up and down from season to season, from day to day, and even from minute to minute, reflecting supply and demand for the grain. Exchanges make it easy to keep track of these movements because they publish the prices that buyers and sellers agree on. Prices on the exchange are the most reliable because this is where the most trading takes place.
- **Standardized products.** Trading on an exchange requires that the grain be graded. It is possible to trade "Grade 1 white dent maize" on an exchange. It is not usually possible to trade grain without having it graded, although in some cases an exchange may accept ungraded grain for offer on an "as per sample" or "f.a.q." (fair average quality) basis. If the buyer accepts, it can be contracted on that basis.
- **Dispute resolution.** If a dispute arises that the parties cannot resolve between them, the exchange's arbitration rules will come into effect. The parties can agree to the appointment of an arbitrator from a list provided by the exchange. If they cannot agree on an arbitrator, the exchange's arbitration board will appoint an arbitrator to review the disagreement. That saves time and money and avoids the need for legal action (see Chapter 8).
- **Cost-effectiveness.** An agricultural commodity exchange provides a very cost-effective marketing system. It brings together many potential buyers and sellers, and transactions are conducted quickly and efficiently.
- **Empowerment.** Because the information on an exchange is transparent, it opens up choices. Smallholder farmers or small-scale traders can know what the price for their grain should be, so can negotiate accordingly.

However, this does require that they fully understand the arrangements relating to warehouse receipts and exchange trading. For example, they must understand that if they deposit 1,000 kg of grain they will receive less than that back because of unavoidable losses (see Chapter 4).

What can an exchange not do?

An exchange cannot do certain things.

- An exchange does not **set the price** of grain. Instead, the prices depend on dozens, hundreds or thousands of individual agreements between buyers and sellers. They depend on the supply and demand for the grain at a particular time and place.
- An exchange cannot **advise participants** when to buy or sell. That is the job of a broker.
- An exchange cannot **advise what is likely to happen** in the future. That is also the job of the broker. The exchange provides information on current and past trades. It is up to the brokers (and other parties to the transaction) to interpret this and other information and make decisions accordingly.
- An exchange does not **guarantee contracts** or performance in spot or forward markets. It does offer arbitration to help resolve disputes.

Exchanges in Africa

The idea of commodity exchanges in Africa has long had top-level political support. The 1991 Abuja Treaty (which created the African Economic Community) first introduced the idea of an African commodity exchange and the use of warehouse receipts. In its 2005 Arusha Declaration on African Commodities, the African Union recognized the important role that exchanges have in the agricultural sector, and called on the international community to support commodity exchange initiatives in Africa and the introduction of warehouse receipts.

Various commodity exchanges have been established in the continent. Here are brief descriptions of two established exchanges: SAFEX in South Africa and ACE in Malawi.

SAFEX: South African Futures Exchange
www.safex.co.za

The agricultural derivatives division of the South African Futures Exchange was founded in 1995. It was the third agricultural commodities exchange set up Africa, after ZIMACE in Zimbabwe and ACE in Zambia. Unlike the others, SAFEX was set up as a futures exchange from the outset.

It continues to operate with an increased range of contracts. It is now part of the Johannesburg Stock Exchange. While it is currently almost entirely used for South African produce, it has been making efforts to involve neighbouring countries. The Zambian government, for example, recently approved trade on SAFEX by Zambian companies.

BOX 18. HISTORY OF SAFEX

1995	Agricultural commodity division of the South African Futures Exchange founded. 100-ton white and yellow maize futures contracts introduced, with Randfontein (a town near Johannesburg) as the reference point (the delivery location for calculating prices).
1997	A100-ton bread-milling wheat contract introduced, starting with 62 registered silos. (Today there is a 50-ton contract with 3 deliverable grades.)
1998	Options on maize futures introduced, and later expanded to all products.
1999	A 100-ton Cape wheat contract introduced, with Bellville (a suburb of Cape Town) as the reference point. The division becomes a founding member of the Association of Futures Markets.
2001	The Johannesburg Stock Exchange buys SAFEX, and the Agricultural Products Division is created within JSE.
2002	25-ton soybean contract introduced, originally with four delivery points. (Today there are 75 delivery points.)
2006	SAFEX starts accepting electronic silo receipts (= warehouse receipts) issued by SILOCERTS Pty Ltd (www.silocerts.co.za). SAFEX signs a licensing agreement with CME Group (which runs the Chicago Board of Trade) to introduce a 100-ton maize contract on SAFEX.

ACE: Agricultural Commodity Exchange for Africa, Malawi
www.aceafrica.org

"ACE has helped me to compete with larger traders and has increased my access to markets. (I've had) increased revenue through ACE contracts and the ability to build longer term links or relationships with suppliers."

– Lawrence Chikhasu, representing a group of 400 farmers in Mchinji, Malawi

BOX 19. HISTORY OF ACE

2006	
October	ACE launches its internet trading platform and goes live.
2010	
February	ACE conducts the first bid-volume-only trading session.
May–June	ACE invites farmer groups to bid-volume-only trading sessions.
July	Farmers win a bid-volume-only contract: the World Food Programme awards AGRA (Alliance for a Green Revolution in Africa) beneficiaries a contract to supply maize.
December	ACE trading platform (bid offer match) reaches 40,000 tonnes, worth US$13,200,000.
2011	
January	The World Food Programme procures grain from the region using the bid-volume-only system.
March	CP Feeds, the largest poultry feed mill in Malawi, joins the bid-volume-only platform.
May	ACE uses Esoko, a market information system developed in Ghana, to disseminate market opportunities and information via SMS.
July	ACE registers GSL Silos, a company with 12,000 tonnes of grain-storage capacity, for participation in its warehouse receipt system.
August	The first ACE warehouse receipt is issued.
October	The first warehouse receipt is sold to a large South African trader.

The Agricultural Commodity Exchange for Africa in Malawi started trading on 26 October 2006 using an internet-based system. It is designed to be a regional trading platform. An additional trading system was designed specifically for the World Food Programme's "Purchase for Progress" initiative.

It has been widely used by both small and large market participants. ACE also runs a warehouse receipt programme and has agreements with storage companies, farmers' associations and government agencies to provide approved storage facilities for this purpose.

In 2012, ACE is testing and introducing new trading software. This will make it even easier for smaller operators to access the trading facility. ACE currently has members in seven countries in Africa.

Bid-volume-only. ACE hosts an auction platform known as ACEBVO (Bid-Volume-Only), where a potential buyer can bid for a certain amount of grain at a particular grade and delivery location, but without specifying the price. ACE notifies registered suppliers and invites them to offer to sell grain, and to name the price they want. The system works like a reverse auction (also known as a "Dutch auction"): the suppliers tend to start out asking for a high price, but drop their prices during the trading session because they want to sell their grain.

At the end of the session, the buyer can select the most competitive offers. ACE generates the contracts and settles the trades.

8 Trade

contracts and dispute resolution

Contracts are necessary to specify the terms under which two parties agree to do business. They can be used for trading in grains even where commodity exchanges are not used. All it takes for a contract is a willing buyer and a willing seller who are both ready to honour an agreement. It is important that those involved are aware of the obligations that contracts imply.

A contract is an agreement between two or more persons, which is legally enforceable.

Contracts are important for grain trading because:

- They specify the **full details** of the trade (the quantity, price, etc.) as well as the buyer and seller (and their representatives where applicable).
- They specify the **responsibilities and obligations** of both the seller and the buyer.
- They make **buyers** confident that they will actually get the grain they pay for, where and when they want it, and of the right type and quality.
- They make **sellers** confident that the buyer will actually pay for the grain.
- They can be used to **reduce risks** such as price risk (the risk of prices going up or down) and performance risk (the danger that either the buyer or seller does not fulfil his or her obligations).
- They specify what must be done in case there is a **disagreement**.

From a **commercial perspective**, a contract is a useful marketing tool that can be used to minimize the risk of price fluctuations.

From a **legal perspective**, a contract is a legally binding document that must be fulfilled.

The contracting process

Contracts are negotiated. During the negotiations, the parties must make clear that they agree to the same terms. This is normally done by an **offer** and an **acceptance**. One party makes an offer, which the other party either accepts or rejects.

Before starting the negotiations

Before the parties start, they must understand the process of negotiating a contract.

- They should be confident with the party they intend to have dealings with.
- They should record the details of the contract, preferably in a book or diary.
- They must understand their role and obligations. They should be careful if they commit to supplying grain, because if they fail to fulfil the contract, there are likely to be financial consequences.

Negotiating the contract

The person negotiating the contract should record the time, name and title of the person they are speaking to in their book or diary. He or she should discuss the items in Table 7, noting the details of the negotiations so there is a record of what was agreed.

Receiving and verifying the contract

The negotiator should read and check the contract details against the notes they recorded during the conversation with the buyer or seller. He or she should ensure the contract and the diary notes agree. It is important to check the fine print to avoid any unpleasant surprises.

If there are any discrepancies, the negotiator should contact the buyer **immediately** to resolve these. If there is uncertainty about a term or condition, he or she should contact the buyer and have it explained. If still unsure, the negotiator should seek advice.

After receiving and confirming the contract, the negotiator should document any changes made in subsequent conversations with the buyer. These, too, should be confirmed in writing as soon as possible.

When the negotiator is confident that everything is correct, he or she should sign and date the contract. One copy is sent to the other person, and another goes in the negotiator's files. (It is best to keep two copies in separate places in case one gets lost or destroyed.)

TABLE 7. A GRAIN CONTRACT: THINGS TO CHECK IN NEGOTIATIONS

Items in the contract	Things to check while negotiating – and before signature
Commercial terms	
The type of commodity sold	
Quality (grade) of the grain	The grain type and quality (grade) required, the variety, protein and moisture content, screenings, and any premiums or discounts applicable. (Screenings are small grains that pass through a certain sieve size. If the percentage of full grains is high, it may be possible to sell at a premium.)
Date by which delivery is to be completed.	The delivery date or period.
Location of delivery	Where the delivery point is.
Price (or the formula to be used in determining the price, including the interest rates)	The price and whether it includes or excludes taxes and duties. Who has to pay any fees or charges that apply (such as taxes or local government levies).
Price adjustment if it is not possible to meet the specified grade	
Quantity being contracted and the acceptable weight tolerance	The quantity required, and any tolerances (amounts over or under that amount).
Full **details** of both buyer and seller	
Signatures of both parties and the **date** of signing	
Jurisdiction	Which country's legal mechanisms will be used to settle any disputes.
Dispute resolution	What happens if the seller is unable to deliver the grain as specified in the contract; the mechanisms to deal with any disputes. Trades made on a commodity exchange may include a requirement to refer disputes to arbitration (see below).
Force majeure	What happens to the contract if an extraordinary event (such as a war or earthquake) occurs (see below).
Performance Terms	
Delivery details and who meets these costs	The price may be ex-warehouse (delivered at the local depot or silo), or ex-farm. This indicates whether the buyer or seller is responsible for the transport, storage and handling charges. See the section on Incoterms below.
Payment terms	When the payment is due and how it will be made.
Documents	The documents that must be presented when the grain is handed over.
Discharge rate	What happens if the loading or unloading is faster than expected. This is normally used for sea consignments.
Demurrage	What happens if transport is delayed (see below).
Weighing	Whether the weight of the load is measured at the loading time or at the destination.
Sampling and **inspection**	
Packaging and labelling	The type of packaging (bags, bulk) that should be used.
Analysis methods	The methods used to test for moisture, etc.
Name of broker	If the contract is negotiated by a broker.

Standard contracts

Standard contracts make trading easier because it is not necessary for the buyer and seller to negotiate lots of fine print. That makes trading faster and cheaper.

Standard grain contracts can be downloaded from:
EAGC: eagc.org/index.php/contacts/training/viewcategory/7-list-of-eagc-contracts
GAFTA: www.gafta.com/contracts

Sample contracts for local and international trade are given at the end of this chapter.

Understanding the legalese

Contracts can be full of legalese. Here are some terms that everyone involved in structured trade needs to know.

Contract of agency. A contract of agency is a written agreement between the buyer (or seller) and the broker to conduct business on his or her behalf. It lists the agreed terms and conditions, including the price.

Delivery period. This is the period in which delivery must be made or the contract executed. (i.e., delivered to or transferred from the warehouse).

Force majeure. Force majeure is an extraordinary event or circumstance beyond the control of the parties that prevents one or both parties from fulfilling their obligations under the contract. Examples include a war, strike, riot, crime, or an "act of God" (hurricane, flooding, earthquake, volcanic eruption, etc.). In such situations, both parties are normally freed from their contract obligations. Events that are considered force majeure often have to be negotiated among the parties. For example, the possibility of a government ban on exports may need to be considered. Is that force majeure, or is the seller required to buy the required quantity from another country in order to comply with the contract?

Demurrage. Demurrage is the extra cost incurred if the loading or unloading of the grain on transport is delayed – for example if a ship or lorry arrives late. Compensation is usually paid for such delays. This compensation should normally be reclaimed by the seller under the contract he or she has with the shipper.

Incoterms: International commerce terms. These are an internationally recognized standard trade terms that set out buyer and seller

responsibilities. They are used to develop trade contracts. Table 8 lists the most common Incoterms.

TABLE 8. INCOTERMS: INTERNATIONAL COMMERCE TERMS

Incoterm	Meaning	Details
Departure		
ExWarehouse		The seller makes the goods available to the buyer at the named place (e.g., a factory or warehouse).
Shipment		
FCA	Free Carrier (at a particular place)	The seller is required to deliver goods to a carrier (transporter) named by the buyer.
FOB	Free on Board (at a particular port of shipment)	The seller must load the goods on board a vessel specified by the buyer. The seller must clear the goods for export.
CIF	Cost, Insurance & Freight (at a particular destination port)	The seller must pay the costs, insurance and freight to bring the goods to the port of destination. However, risk is transferred to the buyer once the goods are loaded on the vessel. Used in maritime transport only.
Delivery		
DDP	Delivered Duty Paid (at a particular place)	The seller has to bear all the costs (including duties, taxes, and other official charges payable) and risks needed to bring goods to a specified point of destination.
DAP	Delivered at Place (at a particular destination)	The seller pays for carriage to the named place, except for costs and taxes related to import clearance, and assumes all risks up to when the grain is ready for unloading by the buyer.

Resolving contract disputes

Why disputes arise

Disputes may arise over grain contracts, even between two parties who are both honest and respected. Some causes can be:

- Poorly or hastily drafted contracts that do not foresee questions that may reasonably arise, such as when each party has to do something.
- When important terms of the contract are unclear, causing misunderstanding. For example:
  - The grain seller may not understand the obligation to deliver the contracted quantity of grain.
  - The buyer may not understand the obligation to pay for the grain at the contracted price.

- The grain supplier fails to deliver the contracted quantity of grain to the buyer if another buyer offers a better price. This is known as **side-selling**. It is a common problem among small-scale farmers who need cash urgently and are tempted by the higher prices offered by other buyers.

Dispute-resolution techniques
Disputes can be resolved in various ways:

- **Negotiation.** Here, the parties negotiate directly with one another.
- **Mediation.** This is where a neutral, independent person (the mediator) helps the parties reach their own agreement to settle the dispute.
- **Arbitration.** This is where the parties refer the dispute to a neutral, independent arbitrator, and agree to be bound by the decision he or she reaches. The decision is legally binding and enforceable for both parties.
- **Litigation.** Where the parties cannot settle the dispute using the above techniques, claims are taken to court. Judgments are binding on the parties, subject to the right of appeal.

Commodity exchanges usually require the parties to resolve their disputes through the exchange's own arbitration mechanism.

BOX 20. TRADE DISPUTE ARBITRATION COMMITTEE COMPELS SOUTH SUDAN TO PAY $41M TO UGANDAN TRADERS

"South Sudan to pay $41m in compensation to Ugandan traders who were not paid for goods and services supplied. Among the firms compensated were Aponye Uganda Limited ($8m), Afro Kai Limited ($2.58m), Sunrise and other single claimants who have sought compensation.

"The settlement was done by the Trade Dispute Arbitration Committee tasked with reviewing and verifying trade disputes and claims in South Sudan. Both the South Sudan and the Ugandan governments verified the compensation claims. The Sudanese agreed to pay the compensation…"

Source: www.newvision.co.ug

In general, arbitration is cheaper, more flexible and faster than litigation. This is often in the interest of both parties.

Descriptions of arbitration procedures can be downloaded from:

EAGC: www.eagc.org/index.php/contacts/training/viewcategory/7-list-of-eagc-contracts
GAFTA: www.gafta.com/arbitration.

Sample grain contract for local trade

EASTERN AFRICA GRAIN COUNCIL

Contract No.2: Ex Warehouse (ExW)

Buyer			
Seller			
Contract date			
Commodity			
Quality specifications required	Foreign matter		
	Broken grains		
	Aflatoxin		
	Inorganic matter		
	Pest-damaged grains		
	Discoloured grains		
	Immature / shrivelled grain		
	Rotten or diseased grain		
	Live insect infestation		
	Dead insects		
	Total defective grains		
Quantity (metric tonnes)		Tolerance +/-	%
Number of bags		Size of bags	
Price per unit			
Payment terms			

Delivery period/days		**Delivery Terms**	Ex – Warehouse Location
Handling costs			
Responsibility of seller	Seller to notify the buyer in writing when the commodity is ready for uplift from the warehouse.		
	Weight to be confirmed during loading.		
Responsibility of buyer	Buyer to provide appropriate packing material and equipment.		
	Buyer responsible for the cost of loading the goods from the warehouse.		
Other conditions			
Governing terms	This contract is subject to the provisions of the terms and conditions of the EAGC contract No 2 which are deemed incorporated herein and made part of this contract which the Buyer and the Seller hereby acknowledge, accept and agree to be bound by.		
	EAGC shall arbitrate in case of any disputes.		
	Kenyan Law shall apply.		
Whole agreement	This document constitutes the whole agreement between the parties and no term, condition, warranty or representation shall be of any force and effect unless recorded herein.		
	Any amendment to this agreement shall only be binding if such amendment is in writing and signed by both parties.		
Signed by the buyer		**Signed by the seller**	
Stamp		**Stamp**	
Date		**Date**	

Sample grain contract for international trade

Contract number	00000		
Seller	ABC		
Buyer	XYZ		
Commodity	South African White Maize conforming to South African Grade No. 1 with up to a maximum 10% grade No. 2 at contract price at Sellers' option.		
Specifications		WM1	WM2
	Moisture (max)	13.5%	13.5%
	Defective maize (max)	7.0%	13.0%
	Other coloured maize(max)	3.0%	6.0%
	Foreign matter (max)	0.3%	0.5%
	Pinked maize (max)	12.0%	12.0%
	Deviations b), c) and d) collectively (max)	8.0%	16%
	Aflatoxin (max)	20 ppb	20 ppb

Quantity	10,000 mt +/- 10% at Seller's option at contract price.
Packaging	In Bulk
Weight & quality	Weight and Quality final at the port of loading as per certificates issued by a first class independent surveyor at Seller's option and cost. Certificates issued at time of loading to be deemed as final and binding and shall be part of the documents to be presented for negotiation
Shipment period	1 to 31 December 2012 from origin, both dates inclusive.
Delivery	Cost, Insurance & Freight (CIF) Mombasa port, Kenya as per incoterms 2000.
Price	United States Dollars 000.00 per metric ton (IN WORDS) Cost, Insurance & Freight, one safe berth, one safe port Mombasa, Kenya
Payment terms	Cash Against Documents within 48 hours of fax presentation, Mondays to Fridays. If documents are presented during Saturday, Sunday or holidays, payment to be made on the following working day. Documents to be faxed directly to the Buyer on fax number +XXX XXX XXX XXX 1. Bills of Lading, marked Freight Prepaid and issued to the order of XYZ Maize Millers 2. Seller's Commercial Invoice 3. Phytosanitary certificate issued by relevant authority in country of origin or transit country 4. Fumigation certificate issued by loading silo or first class fumigation company or independent surveyor at Seller's expense and choice 5. Weight certificate issued at load by an independent surveyor of Seller's choice and expense 6. Quality certificate issued at load by an independent surveyor of Seller's choice and expense 7. Insurance certificate Seller will be responsible for PVOC inspections in South Africa. PVOC inspection costs will be for account of the Buyer. A copy of the Certificate of conformity will be provided to the Buyer for clearance purposes. The goods will only be released for discharge by the Buyer upon receipt of funds. Any costs and consequences resulting from standing time or loss of berthing slot resulting from late payment by the Buyer, will be for Buyer's account and responsibility.
Shipping Terms	Transshipment allowed. Partial shipment allowed. All lighterage and/or port dues, risks and time at disport for Buyer's account. Geared/Gearless vessel acceptable. Vessel up to 25 years of age acceptable. Overage premium for Seller's account
Discharge terms	Customary Quick Dispatch Buyer to guarantee 10.50 meter Salt Water Draft and LOA of 185 m at discharge port including all channel access thereto. Lighterage/lightening, if any, to be for Buyer's account.

Governing contract	As per GAFTA 59/60. Force Majeure clause as per GAFTA 100 and Arbitration rules of GAFTA 125, in force at the date of contract of which parties admit that they have knowledge and notice, and details above given shall be taken as having been written into such contract form in the appropriate place.
Title of goods	Title of the goods shall remain with the Seller until the goods are paid in full, regardless of whether the commodity has been sold on credit or not.
Risk of goods	Risk of the goods shall transfer to the Buyer when the goods pass the ship's rail at the port of loading.
Amendments	No amendments or variation of this agreement or any of the documents referred to in it shall be valid unless it is in writing and signed by or on behalf of each of the parties.
Assignment	Neither party shall not without the prior knowledge of the other party (such consent not to be unreasonably withheld or delayed) assign, transfer or delegate any of its rights or duties under this contract. However, the Seller may assign this contract, with prior notice to (but without consent of) the Buyer, to any company within the Seller's Group.
Rights to third parties	No term of this contract shall be enforceable by a third party (being any parties: person other than the parties and their permitted successors and assignees).
Severance	If any provision of this agreement shall be found by any court or administrative body of competent jurisdiction to be invalid or unenforceable, such invalidity or unenforceability shall not affect other provisions of this agreement which shall remain in full force and effect. The Buyer and the Seller, by mutual agreement, may delete, substitute or otherwise modify such provision as to correct such invalidity or unenforceability.
Governing law	This contract shall be governed by and construed in accordance with the laws of England.

Thank you very much for this business. Please sign, stamp and return a copy of this contract.

Seller	Buyer
- - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - -
Witness	Witness

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A development economist, Vincent holds a master's degree in international economics from Sorbonne University and a postgraduate diploma in development economics from the University of Paris X Nanterre. He has worked in the field of development since 1995. He started with the French Research Institute for Development (IRD) in Guinea, and then worked with the Agence Française de Développement (AFD) in Senegal. He returned to Paris to work as a project manager for agribusiness and private-sector development with leading European consultancy firms, completing several short-term missions in Africa, Asia and Central Europe. He joined CTA in 2003, and has worked mainly on agricultural trade issues, including the development and management of the CTA Agritrade website (http://agritrade.cta.int).

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Ian is the structured trade specialist on the USAID/East Africa Competitiveness and Trade Expansion (COMPETE) Program. He focuses on strengthening warehouse-receipt systems and commodity exchanges, and integrating smallholder farmers into regional value chains. He has established agricultural commodity exchanges in both Zimbabwe (ZIMACE) and Malawi, where he spent six years building the Agricultural Commodity Exchange for Africa (ACE) into a regional exchange with membership in seven countries. He has also provided technical assistance which helped to establish two other exchanges in Africa. He works closely with key regional organizations such as the Eastern Africa Grain Council, East African Community and the Alliance for Commodity Trade in Eastern and Southern Africa to further enhance structured trade in the region. He is a member of the Chartered Institute of Arbitrators.

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Rick is a specialist in the postharvest management of grain in developing countries. His recent interests have focused on postharvest loss reduction which has included leading the World Bank review "Missing food", the development of the African Postharvest Losses Information System (APHLIS), and the development of the World Food Programme's training manual on postharvest handling and storage in support of the Purchase for Progress project.

Rick is an entomologist by training and for over 30 years has been a specialist in the postharvest management of grain in developing countries. In the 1980s, he was concerned with tackling the larger grain borer problem in sub-Saharan Africa. During the severe drought in the Sahel he was the manager of the UK Grain Storage Project based in Mali.

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Robert has over 15 years of experience in business development research and business management. He has been involved in the design and formulation of ground-breaking business development services in Uganda since 1997. He has worked as a project manager, trainer in marketing, model developer and strategic planner. As an idea motivator, Robert is known for his conceptual designs in sustainable development and the use of information technology in development. He is a key architect in the design of Infotrade, an agricultural market information service offered by FIT Uganda. In 2012 he led the FIT team in winning awards sponsored by the Uganda Communications Commission for rural e-services and communication innovation.

Robert holds an MSc in international marketing from Strathclyde University, UK, and an MBA from Dundee University, UK. He is currently pursuing a doctorate in business administration with the Swiss Management Center.

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Herbert is an agribusiness specialist with experience in agricultural

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Alex has over 14 years' experience in the areas of structured trade and commodity finance. He holds a B'com degree in accounts from the University of Dar es Salaam and has attended various courses on structured trade and commodity finance. He worked for over 7 years with Audit Control & Expertise, a company providing collateral control services, where his responsibilities included quality control, verification and regional posts. He worked with Standard Chartered Bank for 4 years, holding positions ranging from credit analyst and relationship manager to structured trade and commodity finance manager. He has been instrumental in the formation of the Eastern Africa Grain Council and has assisted in drafting warehousing laws in Tanzania.

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Gerald Makau Masila holds a master of science in agricultural economics and a bachelor of arts in geography and economics, both from Egerton University, Kenya. He has extensive training and experience in general management, sales, marketing and corporate communications. He previously worked for British American Tobacco in various capacities in Kenya and East Africa between 1996 and 2004 in the trade marketing and corporate & regulatory affairs departments. He was head of sales and marketing for the New Kenya Cooperative Creameries between 2004 and 2006, managing director of Kenya Wine Agencies Limited from 2006 to 2009, managing director of the Kenya Planter's Cooperative Union from July to December 2009, and chief executive of his own consulting firm, Acumen Business Consultants, from 2010 before joining the Eastern Africa Grain

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Claude is a Tanzanian consultant who holds a bachelor's of veterinary medicine from Nairobi University, and an MSc in agriculture from Sokoine University of Agriculture, Tanzania. In both degrees he specialized in food and feed safety and quality. He is a former chief standards officer and head of the Agriculture and Food Section at the Tanzania Bureau of Standards, and is former chairperson of the Codex Alimentarius Commission. He specializes in training and installation of food and feed safety systems for industry, training institutions and food- and feed-related associations. He offers services and courses on food and feed safety and quality standards. He also assists governments and regional organizations in the formulation of SPS legislation, including food safety, animal health, production policies and related legislation. He has carried out several consultancies for various international and United Nations organizations in eastern and southern Africa, as well as in Surinam.

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Paul is a British consultant in development communication. He holds a PhD in journalism and mass communications from the University of Wisconsin-Madison. He specializes in easy-to-understand extension materials, developed through intensive writeshops like the one used to produce this book. He also provides consultancy services in various aspects of development communication. He has worked extensively in Africa, Southeast Asia, South Asia, Latin America and the Caribbean.

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Janet is a socio-economist and a specialist in agricultural communications and marketing information systems. She currently works as the regional marketing information and communications manager at the Eastern Africa Grain Council, serving Kenya, Tanzania, Uganda, Rwanda, Malawi, Zambia, South Sudan, Ethiopia and Burundi. She manages the Regional Agricultural Trade Intelligence Network (RATIN), a leading agricultural market information system, and the regional food balance sheet system in the eastern Africa. She has over 10 years' experience in agricultural trade, communications, regional integration and market information systems. She holds a master's degree in sociology, focusing on entrepreneurship development from the University of Nairobi, a bachelor's in community development from Daystar University, and a postgraduate degree in business administration from the Kenya Institute of Management.

Stephen Kiuri Njukia

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Stephen sadly passed away on 22 August 2013.

He was a Kenyan national with a master's in agricultural economics, specializing in international trade and finance from Texas Tech University, USA, where he also obtained his bachelor's in agricultural economics. His assignment with AGRA focused on linking smallholder farmers to markets. After joining AGRA in August 2008, he designed and managed project grants targeting smallholder farmers and small and medium enterprises in six countries.

Stephen had extensive experience in business management and development, as well as in the trading of various commodities and their derivatives. Prior to joining AGRA, he had worked at Chemonics Kenya as a commodity marketing specialist with the Regional Agricultural Trade Expansion Support Programme, a USAID-funded project that promoted regional agricultural trade in 10 countries in eastern and southern Africa. He also promoted and chaired the steering committee that designed the Eastern Africa Grain Council. He previously worked with Cargill Inc., as a commodity trader in Europe and Africa.

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Kevin is a grain handling and postharvest management expert working with Lesiolo Grain Handlers Ltd. Currently pursuing an MBA degree with Egerton University, he has a bachelor of science degree in food science and technology from Egerton University and a diploma in human resource management. He has experience in quality and storage management of grain, warehouse receipting and commodity financing. He has previously developed training materials for grain warehouse receipting and grain handling, storage and warehousing systems.

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Gideon is an agricultural economist and development finance specialist. He holds a PhD in development administration (rural finance specialism) from the University of Birmingham, UK. He had over 10 years' experience in central banking and rural/microfinance in Ghana before joining NRI. Over the past 12 years his work has focused on researching and promoting institutional innovations in commodity trade and finance in Africa and other developing countries. He has managed projects to pilot warehouse receipt systems in Zambia, Tanzania, Uganda and Zimbabwe. He has also been involved in reviewing and advising on restructuring agricultural marketing institutions, including agricultural commodity exchanges in Ghana, Nigeria and Malawi. Gideon has been part of international consortiums involved in capacity building for rural finance in developing countries; urban food supply and distribution policy; household food security and food price variability. He is part of a team of Europe-based experts collaborating with national farmers' organizations in developing countries to empower smallholder farmers in markets, through strengthening their policy advocacy capacity. He is currently leading a project to promote risk management in the farm sector in Burkina Faso, Tanzania and Zambia.

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Prior to joining CTA in July 2012, Lamon was managing director and CEO of the Multi Commodity Exchange of India (MCX) – the world's second largest commodity exchange, with a trading volume of $2.9 trillion in 2011. From

1990 to 2006 (except for a year with the World Bank), he was with the United Nations Conference on Trade and Development, where he was responsible for the work on commodity marketing, risk management, finance and information. He has been board (or advisory board) member of organizations in Africa, Asia, Europe and North America. He taught a course in commodity marketing and risk management at the Institute of Banking and Financial Management of the Faculty of Business and Economics at the University of Lausanne for 5 years. In 2010 he was named as one of the FCI 500, a list of the world's most influential people in financial centres worldwide.

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A Kenyan national, Samwel holds a degree in BSc in agriculture (with a bias in agricultural economics) from the University of Nairobi. He has worked for the Eastern Africa Grain Council since 2008. He is currently in charge of structured grain trading systems, which entails promoting the use of warehouse receipt systems and commodity exchanges, arbitration as an alternative dispute resolution mechanism, grain trade contracts, grain standards, and building the capacity of producer and trader associations.

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Prior to joining CTA in September 2011, Andrew had worked with FAO for 25 years as an agricultural marketing and value chains specialist, heading the organization's value chains group prior to retirement. He has published extensively on value chain topics including many relevant to structured trade, such as an FAO publication on Inventory Credit (with J. Coulter), an analysis of market information services around the world, and papers on the economic and marketing aspects of postharvest management. He also published a series of FAO Extension Guides, including one on Maize Marketing in Africa and one on Understanding and Using Market Information.

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Isaac holds a postgraduate diploma in marketing from the Chartered Institute of Marketing, UK and a bachelor's degree in commerce from the University of Nairobi. He is a commodity markets and trade specialist with more than 18 years of experience in developing marketing and trading approaches and interventions in east and central Africa. His work has aimed to enhance the competitiveness of a dozen staple food value chains, including maize, rice, wheat, and millet through improved business and marketing planning, and facilitating collaboration between the public and private sectors. He has experience in negotiating contracts between buyers and suppliers. He has worked closely with regional value chain actors to develop staple food competitiveness strategies to improve access to markets and reducing trade barriers for regional grain traders and processors. He has linked smallholder suppliers to large private exporters, establishing new markets for the East African agricultural industry in India, China and Japan. He is familiar with assessing profitability, growth potential, and risk management in creating new business opportunities for large private corporations. An active member in several regional agricultural trade policy initiatives, he was awarded the Global Leadership Certificate in 2008 in Tokyo as part of the Global Scholarship Programme

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Jane is an agribusiness specialist with over 10 years of experience in marketing, sales and distribution management and project management. She has worked for some of the most reputable companies in eastern Africa including AAR Health Services, East Africa Breweries and Smart Logistics Solutions, where she managed several donor-funded agribusiness projects. She holds a master's in business administration specializing in strategic management, from Kenyatta University, and a bachelor of science in agriculture and home economics from Egerton University. She also has numerous certificates in marketing, market research and microfinance, giving her a combination of credentials in both business and agriculture. She is currently a project manager at the Eastern Africa Grain Council in charge of the AGRA-funded project on strengthening the warehouse receipt system in Kenya.

Glossary

SMALL CAPITALS indicate other entries in the Glossary.
➡ means "see also".

Abiotic factors affecting grain quality. Grain rubbish, broken kernels, temperature, humidity and moisture content. ➡ BIOTIC FACTORS

Aflatoxins. A type of MYCOTOXIN produced by many species of aspergillus fungus, the most important being *Aspergillus flavus* and *Aspergillus parasiticus*.

Arbitration. A DISPUTE RESOLUTION method where the parties refer the dispute to a neutral, independent arbitrator, and agree to be bound by the decision he or she reaches. The decision is legally binding and enforceable for both parties.

Bag storage. Storage of grain in bags. ➡ BULK STORAGE

Bailee: The person who stores the grain: the COLLATERAL MANAGER.

Bailer. The owner of grain under BAILMENT: the DEPOSITOR.

Bailment. The situation where one person (the BAILER or DEPOSITOR) owns grain, but someone else (the COLLATERAL MANAGER) has it in his or her possession.

Bid. An intention to buy on a COMMODITY EXCHANGE. It usually indicates both the price and the quantity the buyer would like to purchase. ➡ OFFER.

Biological losses. Loss in viability or germinating capacity of grain.

Biotic factors affecting grain quality. Rodents, birds, insects and moulds. ➡ ABIOTIC FACTORS

Broken grains. Fragments of grain below a certain size.

Broker. Someone who conducts business on a COMMODITY EXCHANGE on behalf of a client. ➡ TRADER (1).

Bulk storage. Storage of grain without packaging in a silo, underground storage or flat store. ➡ BAG STORAGE

Call option. The right to buy a certain amount of grain from the seller on a particular date in the future, at a particular price. The opposite of a PUT OPTION.

CIF. Cost, insurance and freight. The seller must pay the costs, insurance and

freight to bring the goods to the port of destination. The risk is transferred to the buyer once the goods are loaded on the vessel. ➡ INCOTERMS.

Collateral management. A form of warehousing where a grain warehouse is controlled by a trusted, independent third party, the COLLATERAL MANAGER, who prevents the grain owner from disposing of the grain without permission. ➡ FIELD WAREHOUSE.

Collateral manager. Someone who takes control of a warehouse, usually on behalf of a bank or other lender, and manages the contents on its behalf.

Commercial grain storage. Storage of grain where the warehouse is managed by a professional warehouse manager who charges a fee for this service.

Commercial warehouse. ➡ TERMINAL WAREHOUSE.

Commingled storage. Putting grain with similar characteristics into the same silo or storage structure. ➡ IDENTITY-PRESERVED STORAGE

Commodity exchange. An open and organized market place where commodities are traded. Trading is done through a system of BIDS (to buy) and OFFERS (to sell), governed by a set of rules. A commodity exchange brings together many buyers and sellers, usually electronically, for a given product. This makes it easier for buyers and sellers to find each other and agree on prices.

Community cereal bank. A warehouse managed by a farmers' group or cooperative where members' grain is stored.

Contaminants. Any substances not intentionally added to the grain.

Contract of agency. A written agreement between the buyer (or seller) and the BROKER to conduct business on his or her behalf. It lists the agreed terms and conditions, including the price.

Contract. An agreement between two or more persons, which is legally enforceable.

DAP. Delivered at place. The seller pays for carriage to the named place, except for costs and taxes related to import clearance, and assumes all risks up to when the grain is ready for unloading by the buyer. ➡ INCOTERMS.

DDP. Delivered duty paid. The seller has to bear all the costs (including duties, taxes, and other official charges payable) and risks needed to bring goods to a specified point of destination. ➡ INCOTERMS.

Defective grains. Grains that are damaged by pests, discoloured, diseased, germinated, mouldy, immature or shrivelled, or otherwise materially damaged.

Delivery period. The period in which delivery must be made or the CONTRACT executed.

Demurrage. The extra cost incurred if the loading or unloading of the grain on transport is delayed – for example if a ship or lorry arrives late. Compensation is usually paid for such delays.

Depositor. An individual or organization that deposits grain in a warehouse.

Discharge rate. The number of tons a ship can unload in a day.

Dispute resolution. Methods of resolving disputes over CONTRACTS include NEGOTIATION, MEDIATION, ARBITRATION and LITIGATION.

Dispute resolution. The mechanism to deal with any disputes arising from a CONTRACT.

Electronic trading. A form of trading where a computer matches buyers and sellers and generates the contracts for the parties to sign. ➡ OPEN OUTCRY TRADING.

ExWarehouse. The seller makes the goods available to the buyer at a particular warehouse. ➡ INCOTERMS.

FCA. Free carrier. The seller delivers the grain to a carrier (transporter) named by the buyer. ➡ INCOTERMS.

Field warehouse. A PRIVATE WAREHOUSE that is under COLLATERAL MANAGEMENT. It is located at or near the company that owns the grain stored in it.

Filth. Impurities of animal origin, such as animal waste, dead worms, insects, insect wings, animal hair or fur and skins.

FOB. Free on board. The seller must load the grain on board a vessel named by the buyer at a particular port. The seller must clear the grain for export. => INCOTERMS.

Force majeure. An extraordinary event or circumstance beyond the control of the parties that prevents one or both parties from fulfilling their obligations under a CONTRACT. Examples include a war, strike, riot, crime, or an "act of God" (hurricane, flooding, earthquake, volcanic eruption, etc.).

Foreign matter. Any inedible material in the grain.

Forward contract. A contract on a COMMODITY EXCHANGE for grain to be delivered on a specified date in the future. ➡ SPOT CONTRACT, FUTURES CONTRACT.

Fumonisins. A type of MYCOTOXIN produced by a fungus called *Fusarium*.

Futures contract. A type of FORWARD CONTRACT that is standardized (for 50 or 100 tonnes, for example), and for delivery in specified months.

Goods-received note. A document indicating the ownership of the grain that has been deposited at a warehouse.

Grading certificate. A document showing the results of GRADING.

Grading. The process of checking grain quality and classifying it into one of several grades. Grade 1 is the best quality. Grades 2, 3, etc. are lower quality. Grades are defined in GRAIN STANDARDS.

Grain cleaning. A process to remove dirt, sticks, stones, metal and other foreign matter from grain.

Grain standards. These specify grain characteristics and set requirements for SAFETY, QUALITY, and SAMPLING AND TEST METHODS.

Handling losses. Loss in weight due to handling.

Identity-preserved storage. Keeping the grain of each depositor or of a certain type (such as grain from a non-genetically modified variety) separate from the other grain in the warehouse. ➡ COMMINGLED STORAGE

Incoterms. International commerce terms: Internationally recognized standard trade terms that set out buyer and seller responsibilities. They are used to develop trade CONTRACTS.

Inventory control. Recording and accounting for the grain the warehouse receives, stores and dispatches.

Joint key holding. A system where a bank or other lender holds duplicate keys to a warehouse and can check the contents at any time.

Jurisdiction. The country whose legal mechanisms will be used to settle any disputes arising from a CONTRACT.

Litigation. A DISPUTE RESOLUTION method where the claims are taken to court. Judgments are binding on the parties, subject to the right of appeal.

Market information system. A system that collects, analyses, stores and disseminates information on agricultural prices, production, availability, demand, etc. to people involved in grain production and trade. Also be called a market intelligence system, market information service or MIS.

Mediation. A DISPUTE RESOLUTION method where a neutral, independent person (the mediator) helps the parties reach their own agreement.

Moisture content. The amount of moisture in the grain. It is measured with a moisture meter.

Mycotoxins. Substances produced by fungi (moulds) that are harmful to consumer health. They include AFLATOXINS and FUMONISINS.

Negotiable receipt. A type of WAREHOUSE RECEIPT that conveys the rights to the grain. The depositor can sell the receipt to a buyer, who can collect the grain from the warehouse.

Negotiation. Discussions over the terms of a CONTRACT or dispute where the parties negotiate directly with one another. ➡ DISPUTE RESOLUTION.

Non-negotiable receipt. A restrictive type of WAREHOUSE RECEIPT. The grain can be handed over only to the DEPOSITOR or someone they authorize.

Nutritional losses. Loss in nutritional value of grain.

Offer. An intention to sell on a COMMODITY EXCHANGE. It usually indicates both the price and the quantity the seller would like to sell. ➡ BID.

Open outcry trading. A form of trading on a COMMODITY EXCHANGE where the BROKERS or TRADERS meet on the trading floor and shout (or use hand signals) to communicate what they want to buy or sell, and at what price.

Pesticide residues. The level of pesticides present in the grain. The pesticides may be applied before or after harvest. The maximum permissible residue limits are set by national food safety authorities.

Physical damage. Breaking, splitting or cracking of the grain.

Physical losses. Loss in grain weight due to moisture loss, cleaning, insect infestation and theft.

Postharvest management. Management of the grain after the harvest.

Price discovery. Information about the current market prices revealed when a COMMODITY EXCHANGE makes public information about trades.

Private warehouse. A warehouse managed by a trader, group of farmers, processor or wholesaler for their own purposes. ➡ PUBLIC WAREHOUSE.

Public warehouse. A warehouse operated by a warehousing company, where clients can deposit grain. The warehousing company stores grain for a fee, and does not own the grain stored. ➡ PRIVATE WAREHOUSE

Put option. The right to sell a certain amount of grain to the buyer on a particular date, at a particular price. The opposite of a CALL OPTION.

Quality losses. Loss in grain quality, generally due to grain respiration, moulds and insects.

Quality requirements. These cover things that processors or consumers may be concerned with, such as moisture content, broken grains, diseased grains and foreign matter. ➡ SAFETY REQUIREMENTS.

Safety requirements. These cover things that may harm the consumer: the presence of MYCOTOXINS and other poisonous substances, PESTICIDE RESIDUES and physical materials such as stones or metal. ➡ QUALITY REQUIREMENTS.

Sampling and test methods. The procedures for taking samples and analysing them to check whether the grain meets SAFETY and QUALITY REQUIREMENTS.

Spot contract. A contract on a COMMODITY EXCHANGE where the ownership of the grain changes hands immediately. ➡ FORWARD CONTRACT.

Structured trading system. A system where farmers, traders, processors, millers, banks and others enter organized, regulated trading and financing arrangements. Elements can include POSTHARVEST MANAGEMENT, COMMERCIAL GRAIN STORAGE and warehousing, WAREHOUSE RECEIPT SYSTEMS or COLLATERAL MANAGEMENT, COMMODITY EXCHANGES, the use of CONTRACTS, adherence to GRADES and GRAIN STANDARDS, and a MARKET INFORMATION SYSTEM.

Terminal warehouse. A warehouse that is physically separate from the company that owns the grain stored in it. Also known as a commercial warehouse.

Trader (1). Someone who buys and sells on his or her own behalf in a commodity exchange. BROKER.

Trader (2). Someone who buys commodities from farmers and others for resale either on the open market or through a structured trading system.

Transaction costs. The costs of trading grain. They include the costs of obtaining information, transport, finance, paperwork and enforcement of contracts.

Transferrable receipt. A type of WAREHOUSE RECEIPT that is more restricted than a NEGOTIABLE RECEIPT. It must be countersigned by the DEPOSITOR in order for a new owner to pick up the grain. The warehouse operator issues a new receipt in the name of the new owner.

Warehouse certification. A series of checks of a warehouse to ensure it can be entrusted with keeping grain safe. The checks cover, among other things, physical facilities, staff, procedures, capital requirements, insurance and guarantees in case of failure.

Warehouse operator. A person or company that runs the warehouse where the grain is stored, and who issues a WAREHOUSE RECEIPT.

Warehouse receipt. A document that shows a DEPOSITOR has deposited a certain amount of grain in a specific warehouse.

Warrantage. A scheme where grain is stored in a COMMUNITY CEREAL BANK managed by a community organization. The organization can use the grain as collateral for a loan.

Weight certificate. A document showing the weight of grain that has been delivered.

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