REGIONAL EARLY WARNING SYSTEM

FOR

FOOD SECURITY

TECHNICAL

HANDBOOK

FOOD BALANCE SHEETS

General Guidelines

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PREFACE

This is one of several Technical Handbooks produced by the SADC Regional Early Warning Unit in the mid-1990, covering a wide range of topics related to the operation of the National Early Warning Systems (NEWS). Several of these handbooks have recently been revised and translated into French and Portuguese by the FANR Directorate to facilitate their use by all SADC Member States. This particular volume provides general guidelines on **Food Balance Sheet.**

By necessity, the technical handbooks provide guidelines on standard approaches to technical issues. However, while the standard approaches have general applicability in all SADC countries (and beyond), the methodologies can and should be modified and adapted to reflect each NEWUs specific circumstances and needs.

This volume provides general guidelines for the preparation of Food Balance Sheets and owes much to earlier attempts to document the balance sheet assessment approach. In particular, the development of this handbook owes much to the concepts developed in the following two publications:

- Food Needs Assessment Project, FVA/AID, Washington DC, March 1989. A Manual for Food Needs Assessment.
- Global Information & Early Warning Service, FAO, Rome, March 1987. Methodology for the Assessment of the Food Supply and Requirements for Exceptional Assistance Arising from Crop Failure or Unusual Crop Surplus.

The original Food Balance Sheet Vol. 1 General Guidelines was published by SADC Regional Early Warning Unit, then based in Harare, Zimbabwe in June 1994, under the technical guidance of Mr. John M. Rook, who was the Chief Technical Adviser of the FAO Project GCPS/RAF/270/DEN.

The document is, however, being reproduced at a time when Member States have expressed renewed interest in comprehensive food balance sheets – balance sheets with all main foods included and not just main cereal foods (maize, wheat, rice, sorghum and millet) as has been the situation in the past. This means the inclusion of non-cereal foods such as cassava, plantains, meat into both National and Regional Food Balance Sheets. **Appendix D** has been added to the original document and it outlines procedures that may be followed to quantify root crops such as cassava in the national food balance sheets and the associated problems. It is based on a 2002 article by Mr. Bentry P. Chaura, then Senior Statistician/Economist for the REWU, written and presented at the FAO Expert Consultation Workshop on Root Crop Statistics.

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Director,
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1.0 INTRODUCTION

1.1 Scope and Purpose

This Handbook describes the SADC Regional Early Warning System's approach to assessing the adequacy of aggregate food supply situation in a country, or region, known as the Food Balance Sheet. The Food Balance Sheet is a well established methodology which owes much of its early development to the US Department of Agriculture (USDA) and the FAO Global Information and Early Warning System (GIEWS). The SADC Food Balance Sheet is merely a refinement of these earlier approaches.

The Food Balance Sheet is a quantitative tool for pulling together the various multidisciplinary strands of early warning analysis. It is the focal point of SADC's approach to assessing the food security situation at both country and regional levels.

Today, the preparation and interpretation of Food Balance Sheets forms the analytical backbone of the Food Security Bulletins which are released on a regular basis by the SADC Food, Agriculture and Natural Resources Directorate.

This handbook is intended to serve both as a guidebook for the staff of National Early Warning Systems whose task is to prepare and interpret Food Balance Sheets and as a resource for future training activities directed at newcomers to the Early Warning System. The Handbook has been prepared in a logical, straight forward manner, emphasising the practical application of the Food Balance Sheet approach while still providing an understanding of the theoretical basis underlying the methodology. The handbook primarily focuses on the aspects of improving the **quality of data** entering into the balance sheet and the **quality of analysis** coming out of it.

1.2 Structure of the Handbook

The handbook has been divided into a number of parts.

Following this introduction, **part two** of the handbook provides a general discussion of the **methodological framework** of the Food Balance Sheet approach. The general concept of the Food Balance Sheet is explained. Two generic **types of food balance sheets** are distinguished and the **strengths** and **weaknesses** of a food balance sheet assessment are highlighted.

Part three of the handbook identifies a number of **basic considerations** that should be taken into account before any Food Balance Sheet assessment is carried out.

Part four explains in a detailed **step-by step** way how to carry out a balance sheet type assessment for a current or future marketing year using the **standard SADC Active Food Balance Sheet**.

Part five stresses the need to carry out an end of year **reconciliation** to convert an **active** type balance sheet into a **historical** type balance sheet.

A set of **appendices** provide specific details regarding a number of technical issues covered in the main text.

2.0 METHODOLOGICAL FRAMEWORK

2.1 Availability and Accessibility

The Food Balance Sheet is a widely used tool for analysing the overall food supply situation and estimating import requirements of a country or region. In essence, the analysis simply compares **requirements** with **availability** to obtain an estimate of the food **deficit** or **surplus**. The Food Balance Sheet approach to food security assessment is particularly suited to the situation of low income food deficit countries.

The principal strength of the Food Balance Sheet is that it offers an **objective methodology** for assessing overall food security based on **quantifiable facts** rather than qualitative judgements and enables **comparisons** and **aggregations** of such assessments to be made across countries and regions.

However, because of its aggregate nature (it is normally prepared at national or regional level), the Food Balance Sheet only provides an assessment of the adequacy of overall food supplies: A Food Balance Sheet can indicate the extent of any food shortfall and the amount of food that needs to be imported but it cannot quantify how many people are affected nor where the food shortages are most severe.

For this reason, the Food Balance Sheet cannot properly identify all situations of food security or insecurity. In this aspect, two facets of food security are often distinguished; availability and accessibility. **Availability** is concerned with ensuring the adequacy of the overall supply of food. **Accessibility** is concerned with ensuring that each member of the population is able to obtain enough food. As figure 2.1 illustrates, using these two facets, it is possible to distinguish three types of food security situations:

In the **type A** situation, available food supplies are not sufficient to meet the needs of the population and (as a consequence) not everyone is able to obtain enough food. With neither the availability nor accessibility conditions being satisfied there is unquestionably food insecurity. This depicts the typical situation facing a low income food deficit country.

Figure 2.1 Different Food Security Situations

		Availability?	
		No	Yes
Access-able?	No	**A**	**B**
	Yes		**C**

In the **type B** situation, available supplies are sufficient but not everyone is able to obtain enough food. In this case, even though the availability condition is satisfied, there is still food insecurity. This depicts the situation facing many low income not necessarily food deficit countries.

Only in the **type C** situation, where there is both an adequate availability of food and people are able to obtain enough food, can one say with certainty that there is true food security.

The important message for Food Balance Sheet assessments is that while an unhealthy balance sheet indicates food insecurity (a type A situation), a healthy balance sheet does not necessarily imply food security.

It is important to recognise these limitations to the Food Balance Sheet in order to utilise the tool in a responsible and useful way. Like any tool, unless it is handled properly it can be more damaging than useful.

2.2 Active and Historical Balances

In this handbook, the Food Balance is conceived as having two distinct phases:

- An **active** phase, and
- A **historical** phase.

The functions, and as a result, the structures of an active and a historical balance sheet differ.

An **active** balance sheet (**figure 2.2**) deals with the forthcoming or current marketing year. For this reason, most of the elements that make up an active balance sheet are subject to change and as such an active balance sheet is primarily a forecasting tool. Its main function being to determine whether there is enough food to cover various requirements. For this purpose, interest is focused on such indicators as the size of the **projected surplus/deficit** and the scale of any **import gap**. In an active type balance sheet the two sides of the food supply/demand equation do not necessarily balance, as in the case when projected availability is not sufficient to meet projected requirements.

Figure 2.2: Active Balance Sheet

	Maize
Dom. Availability	**243**
- Opening Stocks	160
-Gross Harvest	83
Requirements	**307**
- Food Use	297
- Feed Use	0
-Other Uses & Losses	10
Desired Stocks	**60**
Shortfall/Surplus	**-124**
Net Imports	**10**
- Imports	10
- Exports	0
Import Gap	**-114**
Closing Stocks	**0**

A **historical** balance sheet (**figure 2.3**) deals with a past marketing year. Data within a historical balance sheet is not subject to regular revision and remains substantially unchanged over time. The primary purpose of a historical balance sheet is to explain how available food supplies were utilised between different uses. As such, the supply and demand sides of a historical balance sheet will **ALWAYS** balance. In an historical balance sheet there are no such concepts as shortfalls, surpluses or import gaps.

It should be apparent by now that an active balance sheet eventually and inevitably becomes a historical balance sheet. This happens at the close of the current marketing year. At this point in time, a reconciliation of the data contained in the active balance sheet should take place to ensure that availability and utilization balance.

Figure 2.3: Historical Balance Sheet

	Maize
Total Supply	**253**
Opening Stocks	160
Gross Harvest	83
Imports	10
Total Utilisation	**253**
Domestic Utilisation	214
Exports	30
Closing Stocks	9

Although the primary focus of this handbook is with the active phase of the Food Balance Sheet, the process of transforming an active balance sheet into a historical one is also dealt with. In most cases, this end of the year reconciliation is not generally undertaken in the SADC region. One consequence of this is that balance sheets from the past years cannot be used to make extrapolations for future active balances.

2.3 The SADC "Standard" Food Balance Sheet

Figure 2.4: The " Standard" SADC Food Balance Sheet

Dom. Availability
Opening Stocks
- Monitored
- Unmonitored

Gross Harvest

Domestic Requirements
- Food Use
- Feed Use
- Other Uses & Losses

Desired Stocks

Shortfall/Surplus

Net Imports
Imports
- Commercial
- Food Aid

Exports

Import Gap

Closing Stocks

Current Stocks

As discussed above, the main focus of this handbook is with the active phase of the Food Balance Sheet. In order to facilitate explanation and understanding, it is necessary for the handbook to adopt a **standard balance sheet structure** (**figure 2.4**). This structure conforms largely with the structural style already adopted by the National Early Warning Systems in many SADC countries.

Every effort has been made to ensure that the terminology used in the standard SADC Cereal Balance Sheet is consistent with that employed in both the FAO/SADC developed Monthly Food Balance Model (MFBM) and the FAO/GIEWS developed Annual Food Balance Model (AFBM), which are described in volumes II and III of the Food Balance Sheets Handbook.

3.0 BASIC CONSIDERATIONS

Before carrying out a balance sheet type assessment of the food supply situation it is first necessary to define a number of parameters which determine the layout and content of the balance sheet.

3.1 Time Frame

The standard time frame for a food balance sheet is a year. But, there are a number of possible candidates for an annual time frame:

- The calendar year;
- The Government's fiscal year;
- The crop year, and;
- The marketing year.

The convention adopted within the SADC region is to utilize the marketing year which is defined as:

the period from one main crop harvest up to,
but not including the next.

But, what ever time frame is adopted it is essential that all data entering the balance sheet must conform to the predefined period of analysis.

Thus, for example, if adopted time frame is the marketing year which runs from April to March (i.e., twelve months), then data on imports, exports, consumption, stocks, etc must conform to this time period.

The one exception to this rule is production data, which is normally reported according to the **cropping year**. Production from any given cropping year enters the balance sheet of the following marketing year (the year during which it would be marketed and consumed). For example, the maize harvest from the 1994/95 cropping year would be entered as the production variable in the annual balance sheet for the 1995/96 marketing year. The distinction between the cropping year and the marketing year is extremely important and care should be taken to ensure that they are properly labelled in order to avoid any confusion or misunderstanding.

It is likely that different types of data which are used in the construction of a balance sheet are collected and recorded according to different time frames.

Thus, for example, trade data maybe recorded by the Ministry of Trade on the basis of the fiscal year (because duties and taxes are involved), while commercial millers may record statistics (stocks, purchases, through put, sales, etc) according to their own financial year.

It is important to recognise the different time frames used by each source of information. Failure to do so is one of the main causes of errors in balance sheets. For example, asking a commercial miller for "the current year's opening stock level" may provide the opening stock position at the beginning of the company's financial year and not, as needed, the stock position at the beginning of the marketing year.

3.2 Commodity Coverage

In an ideal situation it is desirable to include all food commodities in the food balance sheet, however, in practice this is near impossible due in part to the diversity of diets and to difficulties involved in collecting data, especially for relatively minor commodities.

At a regional level within SADC, commodity coverage is presently restricted to the main cereals – maize, wheat, sorghum/millets and rice.

At a national level, important non-cereal commodities, particularly cassava, are also included.

Up to a point, the more commodities that are included in the balance sheet assessment the more accurate and meaningful will be the resultant analysis. As a general rule, country level balance sheets should try to include all the main cereal and non-cereal **staple foods**. A good rule of thumb is to try to capture 75 percent of calorific intake.

3.3 Base Commodity

When dealing with food commodities there is a need to convert data into **standard definitions** in order to facilitate comparisons and aggregations. This is a two-fold problem.

Firstly, certain data, notably for stocks and trade, may be collected for **different forms of the same commodity**. For example, wheat imports may be delivered in the form of **grain** and **flour**. These two forms of wheat need to be aggregated to give an estimate of total wheat imports.

Since different forms of a single commodity have different food contents (a kilogramme of wheat flour provides more calories than a kilogramme of wheat grain) it is would not be correct to add them together without first converting all forms of the commodity into common standard.

The established convention, which has been adopted by the SADC Regional Early Warning System, is to measure commodities in terms of **whole grain** or **unmilled amounts**. Such conversions are carried out using **milling extraction rates**. This is defined as the percentage of whole grain remaining after the milling process. For example, wheat has an extraction rate of between 72 and 80 percent, meaning that100 kilograms of wheat grain will, after milling, be converted to between 72 to 80 kilograms of wheat flour.

Rice is an exception of this general rule, as it is usually expressed in **milled** amounts rather than as **paddy**. When rice is an important commodity, care should be taken to ensure that the gross harvest amounts are expressed in terms rice rather than paddy.

Figure 3.1: Milling Extraction Rates

Derived Commodity	Extraction Rates (%)
Maize meal	80 - 95
Wheat flour	72 - 80
Sorghum flour	80 - 95
Millet flour	80 - 95
Paddy	65 - 75
Cassava flour	25 - 33

Source: FAO

It should normally be possible to obtain country specific milling extraction rates (reflecting, for example, the predominance of commercial, small scale or household milling practices). If, however, this information is not available locally, the **standard extraction rates** provided in **figure 3.1** can be used.

Figure 3.2: Energy Values of Common Staple Foods (Whole grain)

Commodity	Kcal/Kg
Cereals	
Maize	3570
Wheat	3320
Rice	3630
Sorghum	3450
Millet	3410
Non Cereals	
Cassava, flour	3550
Cassava, fresh	1490
Swet Potato, fresh	1210
Cooking Bananas	1530

Source: FAO

Secondly, in addition to providing assessments for individual commodities (maize, wheat, rice, etc), most balance sheets also make some sort of aggregate, **cross commodity assessment** (such as "total cereals").

Because different commodities contain different amounts of energy, it is not strictly correct to add commodities together on a simple tonnage basis. Instead, it is more accurate to convert each commodity into equivalent amounts of a predefined **base commodity** using established **food energy values (fev)**. This base commodity (the common denominator) is normally the dominant commodity in the balance sheet; **maize** in most SADC countries.

However, the practice of using a base commodity when aggregating across commodities is not consistently applied. For example, neither the FAO Global Information and Early Warning System nor the SADC Regional Early Warning System has adopted such an approach. One reason being that where cereals are concerned, their food energy values are fairly uniform. Indeed, even cassava, if expressed in dried form has a food energy value similar to most cereals.

Figure 3.3: Conversion to Base Commodity

125 tonnes of wheat grain
×
3320 (fev of wheat)
÷
3570 (fev of maize)
equivalent to
116 tonnes of maize grain

Nevertheless, if it is decided that this refinement to the balance sheet should be carried out, the exercise is relatively straight forward using the food energy values given in **figure 3.2.** The conversion (see example in **Figure 3.3**) is undertaken by multiplying the number of tonnes of the commodity to be converted (say wheat) by its own food energy values, and then dividing by the food energy value of the base commodity (maize).

3.4 Population Estimates

Population estimates are primarily used in food balance sheets to determine food consumption requirements. Population figures for the reference marketing year of the balance sheet are normally derived from an earlier census and are projected to the reference year using an officially recognised population growth rate. This growth rate is obtained from a comparison of the previous two censuses and is termed the **inter-census growth rate**.

Population figures should be adjusted to the mid-point of the reference marketing year so that the balance sheet assessment is based on the average population during the marketing year in question.

Appendix A gives details on how to calculate the mid marketing year population based on the information from an earlier census.

When updating balance sheets for a new marketing year care must be taken to ensure that the mid marketing year population projections are also revised.

In some countries, cross border migrations influence population estimates. Population figures should always try to provide as accurate an estimate as possible of the actual population in the country or region. In this respect, attention needs to be paid to migrant labour and refugee flows.

Refugees pose a particular problem in that they are not normally recognised in population census data and their number can fluctuate dramatically over a relatively short period of time.

The presence of refugees in a country raises the question as to whether or not they should be included in the balance sheet assessment. This is often a sensitive issue. Nonetheless, the presence of large numbers of refugees can have a serious impact on a country's food system and so it is usually best to include them in a balance sheet assessment. However, it is often advisable to deal with refugees as a specific sub-set of the population and in countries where there is a large refugee population a separate balance sheet should be prepared for them. This should be drawn up in close consultation with relief agencies, including UNHCR and WFP, which will be best informed as to the size of the refugee population and their food requirements, which are usually based on some pre-established ration.

3.5 Units of Measure

Within a balance sheet, all quantities must be expressed in a **standard unit**. The recommended unit is **thousands of metric tonnes**. It is also generally satisfactory to round all quantities to the nearest thousand tonnes. Expressing quantities to any greater degree of detail may imply a level of accuracy which is probably unjustified.

3.6 Trend Projection Method

Active balance sheets often need to resort to **historical** data in order to provide estimates of current or future variables. In particular, estimates of future food requirements may be based on utilisation levels of recent past years.

Moreover, an active balance sheet may be prepared before any empirical data for the relevant year is available. For example, a balance sheet for a new marketing year may be needed before there is any clear indication of harvest prospects, in which case, trends derived from historical data may offer the only sensible basis for production estimates.

It is therefore useful to have a simple yet sound **trend projection method**. **Appendix B** describes such a method which can be used to project estimates of any type of balance sheet data.

4.0 THE ACTIVE FOOD BALANCE SHEET IN DETAIL

4.1 Overview

This, the main section of the handbook, discusses in detail each of the elements in an active food cereal balance sheet. This section is set out according to the structure of the standard balance sheet, depicted in **figure 2.4**.

Domestic Availability

=

Opening Stocks

plus

Gross Harvest

Most balance sheet elements have an **analytical** function in assessing the food security situation. The interpretation of such elements is the key to transforming a balance sheet from a simple descriptive tool to a far more useful **analytical tool**. Throughout this section, therefore, suggestions are given as to how individual elements can be analysed within an overall food security assessment.

4.2 Domestic Availability

Domestic availability is the sum of **opening stocks** and **gross harvest**. It provides an estimate of the total availability of cereals before trade is taken into account.

4.2.1 Opening Stocks

Opening stocks are the quantity of stocks held at the beginning of the marketing year. The definition of opening stocks should be **comprehensive** and should include stocks held at all levels within the food system, from on-farm, through commercial and public grain procuring and milling agents, strategic reserves, wholesalers, retailers, to consumer.

The opening stock for one year should be the same as the closing stock of the previous year. When preparing an **active** balance, the previous year's closing stock should therefore always be reviewed when determining the opening stock position.

Opening stock can be divided into two sub-categories; **monitored** and **unmonitored**.

(i) Monitored Stocks:

Monitored stocks are those that are regularly measured and recorded. Ideally all stocks should fall into this category, however, in most SADC countries regularly monitored stocks at present normally only extends to **strategic reserves** and stocks held by **marketing boards** and **large scale millers**.

One of the principal data collection activities of any early warning system should be to obtain regular (at least monthly) statistics on the level of monitored stocks. In order to facilitate this, specific questionnaires should be designed for each identified stock holder (eg, milling company, marketing board).

When recording the opening stock level at the beginning of the marketing year, care should be taken to avoid confusion of the stock holder's reference year, which (as discussed earlier) may not coincide with the marketing year used for the cereal balance sheet.

(ii) Unmonitored Stocks

Unfortunately, it is difficult to obtain reliable empirical data on all types of stocks. Therefore, some stocks fall into the unmonitored category. Unmonitored, **however, does not mean that such stocks should be ignored**. As stressed above, all stocks have to be taken into account in the cereal balance assessment. To ignore certain types of stocks will lead to an under estimation of available supplies and will result in an unrealistically pessimistic picture of the food security situation.

Difficulties in gauging the level of certain stocks has lead many to make the assumption that such stocks are zero. However, in reality unmonitored stocks may be quite significant and therefore even an educated guess will provide a better estimate than none.

Two types of stocks which normally fall into the unmonitored category deserve particular attention:

On-farm stocks are held by producers for their own consumption or for sale at a later date. The level of on-farm stocks at the **beginning** of each marketing year is one of the main data gaps in the food balance sheets of SADC countries and few, if any, have so far taken serious steps to redress this situation.

Without any real data, an educated guess as to the level of such stocks could be made in conjunction with extension and other knowledgeable staff so that at least some indication of their level could be included under unmonitored stocks.

However, in view of the importance of these stocks, ***steps should be taken to bring on-farm stock out off the unmonitored category and into the monitored stocks category.*** This requires some means of measuring the level of such stocks ***at the beginning of the marketing year***. How can this be done?

Bearing in mind that most early warning systems already carry out some sort of **pre-harvest field survey** on-farm stocks could be incorporated into future surveys. In countries which have established sampling frames for carrying out pre-harvest crop forecasting field work, it should be relatively simple to include a question or two regarding the present level of on-farm stocks in such survey.

Ideally, of course, one would want to physically measure the size of on-farm stocks during such pre-harvest surveys. However, this may not always be feasible.

If questions rather than actual measurements have to be resorted to, it should be acknowledged that while producers probably have a fairly good idea of the level of their on-farm stocks at any point in time, they may, for various reasons, chose to falsify their answers. For this reason, it would always be useful to review the results of such surveys with local extension officers who should be able to provide some sort of quality check.

Finally, it is essential that any survey to determine the level of on-farm stocks at the beginning of a marketing year be carried **just prior to the harvest**, as to include any part of the current season's production would lead to double counting and exaggerate the true level of on-farm stocks and, ultimately, domestic availability.

Private traders stocks are gaining increasing significance as grain markets within the SADC region become more liberalised. In many SADC countries, growing numbers of private traders already hold substantial stocks of basic food commodities. Once again, the problem faced is how to capture reliable data on the level of such stocks. The issue is particularly problematic when there are many individual traders involved. However, where such traders have organised themselves into an association it may be fairly straight forward to establish a routine questionnaire which provides data not only on the level of stocks at the beginning of the marketing year but on a regular monthly basis. Even if there is a month or two delays in obtaining such information it will provide a better estimate of the level of such stocks than merely assuming them to be zero.

Where there is no formal association of private grain traders, endeavours should be made to identify and contact at least the major traders and request them to supply regular statistics on their stock levels.

Finally, it should be recognised that the distinction between **monitored** and **unmonitored** stocks is not rigid and that the types of stocks defined under each category may vary from one country to another (depending on the relative sophistication of their data collection systems) and with time (as data collection activities expand to encompass more and more types of stocks).

4.2.1.1 Analysing Opening Stocks

A simple way to assess the adequacy of the overall level of opening stocks is to compare them with domestic requirements and to then express them in terms of **the number of months of available supplies,** to make, for example, a statement such as;

'...opening stocks are estimated to be equivalent to

two and a half months of requirements..."

The opening level of **monitored stocks** should also be compared with the level of **desired monitored stocks** (see below) to assess whether or not actual stock levels at the beginning of a marketing year are on target. If opening monitored stocks are well below their desired level this may be a reason for concern. If, on the other hand, opening stocks are well above their desired level, a draw down of stocks – by increasing export, for example – may be an option for decision makers to consider.

Opening stock levels, particularly on-farm retention levels, can also be compared with **historical** data to get an insight into their relative levels. A marked divergence from a historical norm may be worth highlighting.

4.2.2 Gross Harvest

Gross harvest is the quantity harvested, or expected to be harvested, over the full twelve months of the marketing year.

Harvest is qualified as **gross** because it refers to the full amount of the harvest before any deductions are taken for post-harvest losses, seed use, etc. This distinction is very important since these deductions are included elsewhere in the food balance sheet (see **domestic utilization**).

Although post-harvest estimates normally provide the most accurate assessments of the gross harvest, a food balance sheet for a new marketing year usually has to be prepared well before such data normally becomes available.

4.2.2.1 Early season Forecasts

Within the SADC Regional Early Warning System, preliminary food balance sheet assessment is normally carried out some three or four months before the main harvest, when early quantifiable forecasts of the main harvest become available. Such "initial" forecasts can be based on a number of different sources of information:

- at least preliminary, but hopefully near final **estimates of planted area**;
- early results from **agro-meteorological crop yield models**;
- results from early season **farmer surveys**;
- extension field staff responses to **regular crop stage and condition reports**;
- analysis of **remotely sensed** information, and;
- **historical area, yield and production** data sets.

Since (with the exception of the historical data sets and, perhaps, the current season area estimates) none of these sources of information will be particularly accurate at this relatively early stage of the harvesting season, preliminary forecasts of harvests should be based in a **synthesis** of information from all sources rather than any one source.

This is best achieved in a **round table discussion** involving the various interested parties including extension, meteorological and statistical services, as well as, the National Early Warning System. The consensus outcome of such a meeting should be carefully presented in a briefing paper, detailing the various factors and considerations that were taken into account arriving at the conclusion. The clear documentation of the early forecasting process will prove invaluable when the results have to be reviewed at a later stage.

4.2.2.2 Final Crop Forecasts

As the growing season draws to an end, harvest prospects will become more certain. Normally, therefore, a second and final forecast of production will be carried out prior to the commencement of the harvest. At this stage, new and more reliable information should be available with which to review and revise the preliminary forecast figures. In particular, two sources of quantified data should now be available:

- results from **pre-harvest crop surveys**, and/or;
- revised results from **agro-meteorological crop yield models**.

In an ideal world, the result from crop surveys and agro-meteorological yield models should compliment each other and would enhance confidence in the reliability of the final forecast. However, this convergence of information may not occur, making the job of harvest projection rather more challenging! In these circumstances, the best course of action may not necessarily be to arrive at a compromise between the two sets of results, at least, not until some assessment has been made of the respective quality of the two sets of results.

A simple quality check of each set of data should be carried out by comparing previous years results from the two methods with actual harvest estimates (as distinct from forecasts), if these are available. If one or the other shows a significantly better correlation with the actual estimates, there is good reason to accept the results for that method and reject the other. This type of checking, however, requires several years of historical data for each of the methods concerned.

If either of the methods has only recently been introduced the historical data necessary to make a judgement on the relative reliability of each method will not exist. Under these circumstances, or when there is no clear separation between crop

forecasting and estimation exercises, one may have little option but to resort to some sort of synthesis of the two sets of information.

4.2.2.3 Post-Harvest Estimates

As the marketing year progresses, Governments may issue official estimates of production which are based on surveys carried out at the time of harvest. These **crop estimation surveys** are normally more detailed and more accurate than earlier crop forecasting methods and often involve crop cutting exercises to determine actual yields. If and when the results from such crop estimation surveys become available, the general rule should be to ***replace the forecast figures of gross harvest in the food balance sheet with the more reliable estimates of production***.

In some cases, however, official crop estimates do not become available until the marketing year is already well under way. In other cases, delays are more serious and the estimates are not released until the marketing year in question has already ended. Nevertheless, ***no matter when official estimates are released, they should be incorporated into the balance sheet.*** Even if the estimates are not released until the marketing year, the relevant **historical** balance sheet should be adjusted accordingly. Moreover, when the change over from forecasts to estimates does occur, this should be ***clearly highlighted in the text accompanying the food balance sheet.***

4.2.2.4 Subsidiary Harvests

Sometimes it is necessary to quantify a harvest in a food balance sheet even before the crop has even been planted. This situation most commonly arises in the case of **subsidiary harvests**, like the winter wheat crop has been in Zimbabwe. Another, more crucial, example is the short rains harvest in Tanzania. In both cases, these ***subsidiary crops are planted and harvested within a marketing year***.

Since planting of a subsidiary crop does not occur until after the marketing year is under way, a balance sheet prepared before or at the beginning of a marketing year will have no real information upon which to base the forecast of the subsidiary harvest. In these circumstances, one has to resort to a **trend projection method**, which projects future production on the basis of historical data. Such a methodology is (as already mentioned) described in **Appendix B.**

Once the subsidiary cropping season has got under way, the early and final forecasting methods described above can be similarly applied.

4.2.2.5 Analysing Gross Harvest Figures

Domestic production is probably the most volatile of all the variables affecting the food security situation. Marked changes in production levels from one year to another are a major source of disruption and as such should be highlighted in any balance sheet assessment. Gross harvest figures for a current year can be compared with

historical levels to assess relative production performance. It is useful to express the current harvest figure as **a percentage of both last year's and of "normal", which can be defined as the average over the past 3 or 5 years**.

4.3 Domestic Requirement

Domestic requirement is the total amount of food required over the time frame of the balance sheet (normally the marketing year) and can be disaggregated in a number of ways. In the SADC food balance sheet, three components are normally distinguished; **food use, feed use** and **other uses/losses.** Preparing accurate estimates of requirements is one of the most challenging tasks involved in preparing a food balance sheet.

In an **active** balance sheet, domestic requirements can be determined in two ways:

Domestic Requirements

=

Food Use

plus

Feed Use

plus

Other Uses & losses

- The **status quo** method - an **aggregated** approach which calculates **gross** domestic utilization directly using a trend projection method to extrapolate historical levels of **domestic utilization** for the current or future year
- The **nutritional** method - a **disaggregated** approach which quantifies the **food use** element of domestic requirements on the basis of **nutritional targets**.

4.3.1 Status Quo Method

The **status quo method** is so called because it projects food requirements that are **typical** of past utilization of consumption levels.

Where several years (at least six) of historical balance sheets are available, the methodology can be employed **extremely** simply and amount to no more than applying the **trend projection method** to historical domestic utilization figures.

When the necessary historical balance sheets do not exist it is still possible to apply the status quo method using commonly available data. In these circumstances, it is necessary to determine **apparent domestic utilization**, which can be expressed as the following equation:

$$U = P_g + [S_o - S_c] + [I - E]$$

Where,

U is apparent domestic utilization;

$\mathbf{P_g}$ is gross production;

S_o is opening stocks;

S_c is closing stocks;

I is imports, and;

E is exports.

This equation can be simplified into the following form:

$$U = P_g + S_d + I_n$$

Where,

S_d is stock drawn down (i.e., opening stocks less closing stocks), and;

I_n is net imports (i.e, imports less exports).

The trend projection and status quo methods are explained in detail with the use of a worked example in **Appendix B**.

4.3.2 Nutritional Method

The **nutritional method** calculates what might be termed an **adequate or desirable level of food consumption** as determined by the amount of food necessary to ensure a healthy active life.

The nutritional method only calculates the **food use** element of domestic requirements. Therefore, if this method is used, the other, albeit secondary, components of domestic utilization (**feed use** and **other uses/losses**) need to be derived separately.

The nutritional method uses a **per caput energy requirement level** (expressed in terms of calories) and **population projections** to determine current or future year requirements.

Using the age and sex structure of a population, and its patterns, it is possible to calculate an average per caput energy requirement for a given population. FAO has produced a manual and a computerized worksheet to assist planners in calculating the energy need of a population (see: *James, WPT & Schofield, EC,* ***Human Energy Requirements: A Manual for Planners and Nutritionists.*** *Oxford University Press. 1990*)

The calculation of average per caput energy requirements for first principles using the above mentioned manual should provide an extremely accurate result. It is however a fairly time consuming process and requires detailed data on each of the variables. If therefore either the data or the time is not available to undertake this detailed

assessment, the standard requirements levels for the ten SADC member States given in **figure 4.1** are accurate enough for early warning purposes and can be applied. The "**minimum**" requirement represents the number of calories needed to maintain the current activity level and health status, whereas the "**desired"** level allows for some nutritional improvement.

Figure 4.1: Average Daily Calorie Requirements (KCals/caput/day)

Country	Minimum	Desired
Angola	2081	2150
Botswana	2033	2110
Lesotho	2009	2133
Malawi	1977	2110
Mozambique	2143	2169
Namibia	2033	2110
Swaziland	1978	2112
Tanzania	1953	2094
Zambia	2058	2132
Zimbabwe	2054	2129

The nutritional method is explained in detail with the use of a worked example in **Appendix C.**

4.3.2.1 Feed Use

As mentioned above, if the nutritional method rather than the status quo method is used to calculate domestic requirements then **animal feed use** has to be determined separately. There are several ways of estimating the food requirements of the livestock sector.

Where data is most sparse it is possible to resort to the "**share of production**" method, which applies a standard percentage of actual or expected gross harvest. The appropriate percentage to apply should be determined in consultation with animal and crop extension services.

A more sophisticated, and more accurate, approach is the "**feeding rate per animal**" method which multiplies the number of livestock by some estimate of average per animal feeding rate. Again, an appropriate feeding rate should be worked out in consultation with livestock extension services. If this method is applied, it either has to be done separately for each major livestock category (e.g. poultry, cattle, pigs, etc), or different types of livestock have to be converted into a common denominator, such as cattle equivalents. Conversion factors exist for this process – consult livestock specialists in your country. In countries where there is a significant **commercial feed milling sector** care must be taken not to double count the requirements of the feed mills and the livestock population.

4.3.2.2 Other Uses/Losses

As mentioned above, if the nutritional method rather than the status quo method is used to calculate domestic requirements then other uses/losses also have to be determined separately.

There are three major elements within this category; **seed, industrial use** and **post-harvest losses**.

(i) Seed Use

The amount of the harvest saved by farmers to provide seed for the following season's planting needs to be taken account of. Seed use can be split into two types; **commercially produced seed** and **on-farm produced seed**. For food balance sheet purposes, only on-farm seed which has been taken from the current year's harvest should be taken into account.

In situations of sparse data a "**share of production**" method normally has to be applied. This works in the same way as for animal feed and involves determining a reasonable percentage figure to be applied to the current year's gross harvest to obtain an estimate of seed use for the next season.

A better method, which can be applied once there is an indication of the area planted per crop, is to apply the "**seed rate**" method which multiplies the planted area by a per hectare seed rate. The appropriate seed rate could be that recommended by the extension service, but it should take into account the type of seed being used and prevailing farming practices (seed rates for local seed are often higher than those for hybrid seed).

If estimates of planted areas are not yet available, the "**seed rate**" method can be applied to an historical average area as an interim measure.

If the seed rate method is applied, it is important that **commercial seed** use is not double counted. To ensure this, the estimated quantity of commercial seed must be deducted from the gross seed use to obtain the correct estimate for balance sheet purposes.

(ii) Industrial Use

In most SADC countries, the most significant **industrial user** of food commodities is the **brewing industry**. In this respect, a distinction has to be made between home and commercial brewing.

Home brewing is difficult to separate out from normal food use and, in any case, since it contributes to human energy consumption (at least for a proportion of the population!) it is normally subsumed within food use. Therefore, it is only necessary to estimate the food use of the commercial brewing sector.

The situation regarding **commercial brewing** is, however, not always clear cut. In some cases, the brewing industry may be self contained in the sense that it does not utilise any domestically produced cereal and organizes its own imports to cover its

raw material requirements. If this is the case, the industry can be justifiably ignored from the assessment of food requirements.

On the other hand, if the brewing industry does make demands on locally produced cereals, general cereal stocks or general imports, which would otherwise be destined for food use, then its requirements must be taken into account. In which case, discussions with the brewers should easily establish their anticipated cereal use.

(iii) Post-Harvest Losses

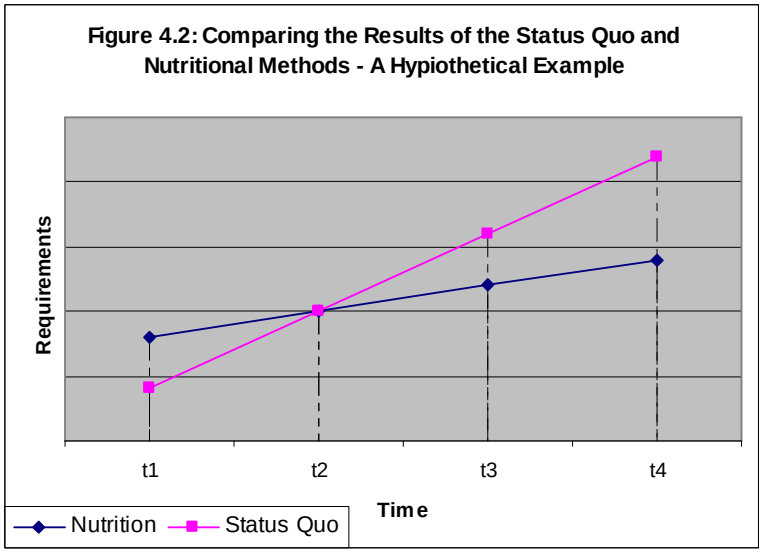
Finally, since **gross**, rather than net, harvest is entered into the balance sheet (see above), it is necessary also to include post-harvest losses as an item under domestic requirements (if the nutritional method is being applied). Post-harvest losses are incurred between the time the crop is harvested and the time it is utilised. These include losses from pests, diseases, spoilage and mishandling. Generally, there is normally no direct empirical data on actual levels of such losses so it is usual to resort to "**share of production**" method to estimate the level of losses. Once again, the appropriate percentage should be determined in consultation with resident experts (extension service, grain marketing boards, research centres, etc).

Which Method?

Faced with an apparent choice between two different methods for assessing domestic requirements; the aggregated approach using the status quo method, and the disaggregated approach using the nutritional method, the question arises as to which of the two to adopt.

Before making a selection, it is important to understand what each method is trying to assess. The graph in **figure 4.2** shows two lines, one indicating the status quo requirements of a country over a period of time (number of marketing years), the other showing the nutritional requirements.

Figure 4.2: Comparing the Results of the Status Quo and Nutritional Methods - A Hypiothetical Example



At the marketing year **t1**, nutritional requirements are assessed to be higher than the status quo requirements. How could this be?

Status quo requirements reflect levels of domestic utilization in previous years. If, in **figure 4.2**, the hypothetical country had been

chronically food insecure in the period leading up to **t1**, the assessed status quo requirements for the **t1** marketing year would reflect this historical insecurity and be correspondingly low. Indeed, as in figure 4.2, status quo requirements could be so low that they do not satisfy nutritional requirements.

With time suppose the hypothetical country in figure 4.2 becomes more food secure. Domestic production starts to rise and peoples' ability to purchase increasingly available supplies improves. As a result, the status quo assessment of food requirements goes up. At the marketing year **t3**, status quo requirements exceed nutritional requirements.

If the status quo rather than the nutritional method had been used to assess food requirements at **t1**, it would imply deterioration in the health status of the population, since nutritional needs would not be met. However, even if requirements had been assessed to be higher using the nutritional method, this would not in itself have guaranteed that nutritional needs would be satisfied, since the nutritional method does not consider the issue of **accessibility** to available supplies. For this reason, if food availability had been planned on the basis of nutritional requirements, not all the supplies made available may have been consumed. The explanation being that the population did not have the resources at their disposal to access a nutritionally adequate diet. Indeed, one might have found that actual consumption were closer to the status quo level, which, unlike the nutritional method, implicitly takes into account issues of accessibility (since they influence past levels of consumption). Following through this argument, the gap between nutritional and status quo assessments at **t1** may give an indication of the additional amount of food relief distributions required to ensure that the nutritional requirements are satisfied.

If status quo requirements exceed nutritional requirements, as they do at **t3 (on wards)**, the choice of methodology is normally clearer cut. In these circumstances, to base requirements on anything less than the status quo level would lead to food shortages and price rises.

It should be apparent from the above discussion that *considerably more insight into the food security situation is obtained if **both** the status quo and nutritional requirements are assessed before it is decided which of the two methods is more appropriate for inclusion in a food balance sheet.*

4.4 Desired Monitored Stocks

Desired monitored stock is a **target** stock level which countries try to maintain in order to avoid short term insecurity. It should be included in all active balance sheets. The desired monitored stock is normally made up of two elements; **Strategic Grain Reserve (SGR)** and **millers' minimum operating stock**.

4.4.1 Strategic Grain Reserve (SGR)

The strategic Grain Reserve provides Governments with a buffer stock with which to respond to sudden supply shortfalls. In some countries, SGR target levels are well defined, while in others there may be no discernable SGR policy. Nevertheless, as a general rule some account of SGRs should be included in **active** balance sheet.

In countries where there is a clear SGR policy, the declared target level of such stocks provides an obvious starting point for determining the appropriate level to include in a food balance sheet.

However, in some cases, the declared SGR target may be deemed to have been set unrealistically high, when compared to the actual SGR level in recent years. In these cases, a lower level target, which reflects attained levels of recent years, should be adopted in the balance sheet.

In countries where there is no apparent SGR policy, the desired level of such reserves can be approximated to a certain number of months of domestic requirements. The precise number of months of stocks it is desirable to retain will vary from one country to another and should reflect normal "**import delivery time**". Thus, a country which is close to its normal import source should not require as many months' reserves as a country which is further away. As a rough rule of thumb, the desired level of SGR should not normally need to exceed 3 months **food use** requirements***, especially if the country has an effective early warning system which will notify decision makers of impeding shortages in good time!***

It is also important to recognise that ***the level of the SGR can and should fluctuate over time***. A SGR should be built up towards its desired level following a good season's harvest and should be drawn down in years following poor harvests in order to reduce import needs and safeguard food security. Thus, the desired SGR level included in the food balance sheet should always reflect the conditions prevailing at the time.

4.4.2 Millers Minimum Operating Stock

In countries where there is a significant commercial milling sector, it may also be prudent to include under desired stocks an allowance for **millers' minimum operating stocks**. These stocks held by larger millers to ensure the smooth operation of their mills. If such stocks are to be included, an appropriate level can be determined directly with the millers concerned.

4.5 Domestic Shortfall/Surplus

The **domestic shortfall/surplus** is defined as domestic availability (opening stocks plus gross harvest) less domestic requirements and desired monitored stock. It is one of the key analytical indicators of the **active food balance sheet.**

Shortfall/Surplus

=

Domestic Availability

less

Domestic Requirements

and

Desired Monitored Stock

A negative figure indicates a **shortfall** and implies that domestic availability is not sufficient to cover domestic requirements and the desired monitored stock. Imports are necessary in order to offset the shortage. Without such imports, stocks and/or utilization will fall.

A positive figure indicates a **surplus** and implies that domestic availability is sufficient to cover domestic requirements and the desired monitored stock and that a surplus is available. This surplus could be utilized in a number of ways; to increase stocks, to increase domestic utilization (consumption), to increase exports or, any combination of the three.

4.6 Net Imports

The **net imports** section of the **active** food balance sheet takes account of flows of food entering (imports) and leaving (exports) the country. The net inflow of food into the country is termed **net imports**.

Net Imports

=

Imports

minus

Exports

In **active balances** it is necessary to **forecast** the anticipated quantity of imports that will be delivered and the anticipated quantity of exports that will be shipped during the marketing year. It is important to recognize that the net imports section of an active food balance sheet records the anticipated amount of trade during the marketing year and **not** the required amount of trade to offset any domestic shortfall or surplus. Thus, where a domestic shortfall is indicated, the net imports section should not record the amount of imports needed to cover the shortfall (this is already indicated by the size of the shortfall) but rather the amount of imports that are **planned** or are **realistically expected** to be delivered during the course of the marketing year.

4.6.1 Imports

Imports are usually divided into two categories; **commercial** and **food aid**. The important distinction between the two categories is not how they are utilized but rather how they are paid for.

Commercial imports consist primarily of imports that are financed directly by the recipient country. They may be purchased by the private sector or by the Government themselves through a marketing board. They might also include imports which are financed by loans (which have to be paid back) from third parties, such as the World Bank. Commercial imports are normally channelled through the marketing system, although, they may be used in Government drought relief or other feeding programs.

Food aid consists primarily of imports that are financed by a donor country or organization. Three types of food aid are generally recognized:

- **Programme food aid** is normally channelled through the marketing system and sold commercially, the sales revenue often being used to establish counterpart funds. Major providers of program food aid are the European Union and the United States;

- **Targeted food aid** is earmarked for a specific population groups and is channelled through such things as school feeding or food for work programs. The World Food Programme is a major provider of targeted food aid; and

- **Emergency food aid** is provided in response to acute deteriorations in the food supply situation, normally at very short notice.

In an **active** balance sheet, commercial imports and food aid can be further sub-divided into amounts **already received** and amounts **still expected**.

Amounts **already received** refer to the quantity of imports so far delivered since the beginning of the marketing year. Before, or at the beginning of a new marketing year this amount will obviously be zero. But, by the end of a marketing year (and in the case of historical balance sheets) all imports will be classified into this category.

Amounts **still expected** refers to the quantity of imports which are still expected to arrive before the close of the marketing year. Before, or at the beginning of a new marketing year, all imports will fit into this category. But, by the end of the marketing year (and in the case of historical balance sheets) no imports will be included in this category.

In **active** balance sheet, the net import section is probably the most dynamic part of the balance sheet assessment. Import and exports arrangements keep on being adjusted throughout the course of the marketing year. Not only will there be a shift of quantities from the "still expected" to "already received" categories as the marketing year progresses (as described above), but, more importantly, information on the anticipated level of total imports will be firmed up. For these reasons *it is important to update the trade section of an active balance sheet on a regular **monthly** basis*.

A regular (monthly) **reporting mechanism** should be established to capture such data. But first, the main import channels should be identified so that data can be collected from the right sources. Needless to say, the reporting mechanism should be as **comprehensive** as possible in order to accurately assess import flows.

Commercial imports are normally channelled through commercial millers, parastatal marketing boards and (increasingly) private grain traders.

Food aid is normally channelled directly by the donor. These can be countries (e.g. United States), international organizations (e.g. European Union, World Food Program) or NGOs. (e.g. Oxfam, Save the Children Fund, Catholic Relief Services).

In setting up a reporting mechanism particular care must be given to a number of points:

- Firstly, it is important to capture both the quantity of imports **already received** as well as the quantity of imports **still expected**. Data on the former should be fairly accurate, while data on the latter will be less reliable and subject to revision.

- Secondly, it is important to ensure that only data relating to the **relevant marketing year** is captured. Suppliers of data may work to different reference years (e.g. calendar year, financial year, etc) and may present their data accordingly. It is imperative that only those imports arriving during the marketing year in question are recorded in the balance sheet.

- Thirdly, it is easy to **double count** imports during a single marketing year because of confusions or misunderstandings regarding the source of such imports. This is especially a problem in the case of food aid which may be donated by one party channelled through another. For example, food aid may be donated by the United States but channelled through the World Food Program or an NGO such as Catholic Relief Services. For this reason, it is important to have a clear understanding of the food aid mechanisms in a particular recipient country. It is also useful to disaggregate import data according to source/donor so that the potential for double counting is minimized.

4.6.2 Exports

In years following good harvests, a number of SADC countries, such as Malawi, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe, can become food exporters. Still others, such as Angola, have the potential to become major exporters in future years. Hence, it is important to quantify outflow of food.

As with imports, an **active** food balance is interested in recording both exports **already shipped** and exports **still expected** during the course of the relevant marketing year and, as such, much of the above discussion on imports is also pertinent to exports.

Data on **already shipped** exports can be obtained simply once the exporting agent has been identified. In most countries exports are still channelled mostly through parastatal marketing boards and data on the actual level of exports can be collected relatively simply. However with growing market liberalization, private traders are

playing an increasing role in food exports (as well as food imports). Moreover, the emergence of private traders and more liberal trade policies may herald an increase in the quantity of food exports. As the number of private traders proliferates, it will be increasingly harder to monitor exports (and imports).

The level of **still expected**, or anticipated, exports is more difficult to assess. It is important to recognize that the level of anticipated exports is not necessarily the same as the level of any domestic surplus. The existence of a domestic surplus indicates that there is, within the country as a whole, a potential exportation surplus. Whether or not this potential materializes into actual exports will depend on a number of variables. In particular, if a domestic surplus is to be translated into actual exports it must find its way into the hands of an export agent. It is often the case, however, that a larger proportion of a domestic surplus actually lies in the hands of producers and that because of logistical and financial problems it is never procured. In this case, the domestic surplus will be utilized in building up on-farm stocks rather than be exported. *A domestic surplus should never therefore be automatically equated with an exportable surplus.* A better indication of the level of anticipated exports may, therefore, be obtained from an analysis of the stock levels and **exports intentions** of parastatal marketing boards and traders.

4.6.3 Unmonitored Trade

In many countries **informal cross border trade flows** are significant, however, these unmonitored and unrecorded flows are extremely difficult to quantify. Nevertheless, if such flows are thought to be significant some approximation of their magnitude must be attempted within the net imports section of the food balance sheet. However, with no hard data to go, it may only be possible to make an informed guess or merely a qualitative assessment as to the direction of such flows and their implication for the balance sheet assessment.

A strong indicator of the direction and magnitude of informal trade is a commodity price differential in adjacent areas of neighbouring countries. The presence of imported goods in border areas is another indicator of the existence of such informal trade.

4.6.4 Analysing Trade

In an **active** food balance sheet, the main form of analysis of trade data is to assess the impact of trade on the overall food supply situation by determining the projected level of **closing stocks** or any remaining **import gap**. These two aspects are integral and explicit components of an active balance sheet and, as such, are discussed under separate headings below. There is, however, some secondary, but nonetheless useful, analytical work that can be undertaken specifically on the trade data.

4.6.4.1 Commercial Import Capacity

One of the key questions that needs to be addressed in the event of a serious increase in the size of the domestic shortfall is how much of the projected import needs should reasonably be expected to be covered by the commercial imports and how much should be met from food aid. An indication of a country's likely **commercial import capacity** in the event of a serious domestic shortfall (as, for example, caused by a drought) can be approximated in a number of ways, using historical balance sheets.

Two simple indicators are:

- The **maximum level** of commercial imports over recent (say 5) years;
- The **average level** of commercial imports over recent (say 5) years.

The **average level** of past imports will obviously give a more conservative indication of commercial import capacity. In determining which level to apply, consideration should be given to the prevailing economic climate. If foreign exchange is tight and world food prices have risen, then it may be prudent to apply the average level. If, on the other hand, there are no foreign exchange constraints and world prices are depressed, the maximum level could be applied. Once the commercial import capacity has been determined, food aid requirements can be derived as a residual.

4.6.4.2 Intra-SADC Trade

In the context of prompting greater trade links between SADC partners, it is also useful to be able to identify the actual amount of **intra-SADC trade**. This analysis is best done with **historical** balance sheets once trade data for a particular marketing year has been finalized.

4.7 Import Gap

An **import gap** exists in an **active** balance sheet if the net imports are not sufficient to cover a domestic shortfall. In these circumstances, import plans need to increase to cover the gap. If the gap is not covered by increased imports (or, sometimes, reduced exports), stock levels will fall. If the import gap is large enough, food shortage will occur. The presence of a large import gap should, therefore, be viewed as an indication of **serious food insecurity**. If net imports are greater than the domestic shortfall, the import gap will be zero.

Import Gap

=

Domestic Shortfall

plus

Net Imports

4.8 Closing Stocks

In an **active** food balance sheet, **closing stocks** are a projection of the anticipated level of stocks at the end of the marketing year. Projected closing stocks are calculated by adding **net imports** and the **desired monitored stock** to the **domestic shortfall/surplus**. This projected figure covers all types of stocks and is normally difficult to separate monitored and unmonitored stock elements. Nonetheless, it is still useful to compare the projected closing stock level of all stocks with the desired monitored stock level to get an indication of the adequacy of the closing stocks. Bearing in mind that closing stocks encompass all stocks, the closing stock level should be well above the desired monitored stock level.

Closing Stocks

=

Domestic Shortfall/Surplus

plus

Net Imports

plus

Desired Monitored Stocks

A common mistake in **active** cereal balance sheets is to project negative closing stock levels. ***Stocks by definition cannot be less than zero***. If the calculated closing stock is a negative figure it should always be reset to zero.

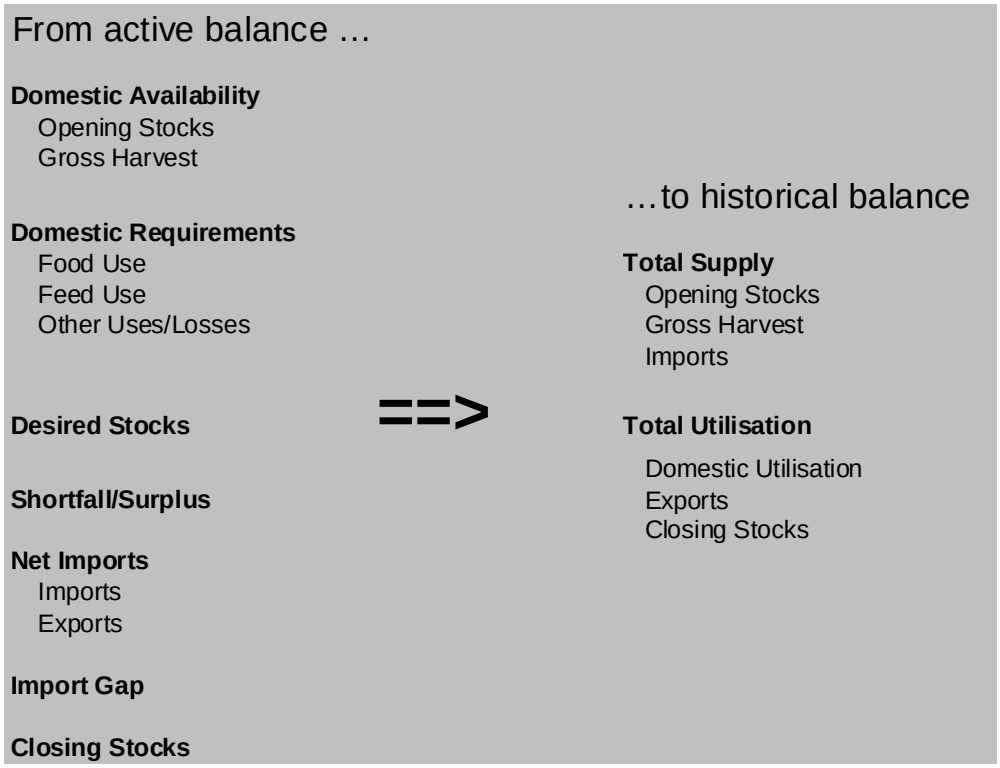
4.9 Current Stocks

Although they do not have a direct function in the overall food balance sheet equation, it is always useful to indicate (at the bottom of each balance sheet) the **current level of food stocks**. Ideally both monitored and unmonitored stocks should be included, but in practice it may only be feasible to record the current level of monitored stocks.

The **current** level of monitored stocks can be compared with the **desired** level of monitored stocks to assess the adequacy of existing stocks. It can also be expressed in terms of the number of months of domestic requirements (see **opening stocks**, above).

5.0 YEAR END RECONCILIATION: ACTIVE TO HISTORICAL.

When a marketing year comes to an end, an important change occurs in the type of information contained in a balance sheet. Instead of looking into the future, the balance sheet now becomes retrospective or backward looking and the information, as a result, should be more reliable. At this point, it is necessary to transform the active balance sheet into a historical one. This essentially involves reconciling the two sides of the balance sheet equation; supply and utilization. In a historical balance sheet these two sides of the equation must balance. Concepts such as "shortfalls" or "import gaps" no longer have any relevance as the purpose of a



historical balance sheet is to show how available supplies were actually utilized. Up to now, this important task has been largely neglected by most National Early Warning Systems in the SADC region. One effect of this is that no NEWS has a true record of the actual supply and utilization situation in past years, which makes it difficult to accurately calculate, amongst other things, the status quo requirements for the future years. All NEWS are strongly recommended to carry out year end reconciliations of their active balance sheets not only for the current and future years when they come to an end, but also for all past marketing years for which active food balance sheets have been prepared. Such a process is neither complicated nor time consuming, as the remainder of this chapter explains.

5.1 Total Supply

In a historical food balance sheet, total supply is composed of three elements:

- Opening Stocks
- Gross Harvest
- Imports

5.1.1 Opening Stocks

When making a year end reconciliation, the opening stock figure can normally be taken directly from the active balance into the historical balance sheet without the need for any alteration. Sometimes, however, an ex-post correction may be necessary, as for example when a major stock holder makes a formal "stock adjustment". If such a correction is required it is important that the closing stock figure for the previous year must also be adjusted. Remember, the closing stock level in one year must always equal the opening stock level in the following year. Of course, opening stocks in a historical balance sheet should include monitored and unmonitored.

5.1.2 Gross Harvest

Similarly, the gross harvest figure presented in the active balance sheet can normally be directly transferred into the historical one when the marketing year comes to a close. On occasions, however, revisions of gross harvest figures do occur after the marketing year has come to an end. When this happens, as in the case of a delayed release of official estimates, the gross harvest figure in the historical balance sheet should be corrected.

5.1.3 Imports

In an active balance sheet a distinction is usually made between imports already delivered and imports still expected. However, by the close of the marketing year, any imports which remain undelivered should be discarded and, therefore, in a historical balance sheet the import figure should reflect only the amount of imports that were received during the time span of the marketing year in question. As in an active balance sheet, it is usual to separate out commercial and food aid imports.

5.2 Total Utilisation

While the supply side transformation from active to historical balance sheet is fairly simple and straight forward, it is on the utilization side of a historical balance sheet that some important adjustments are often necessary at the close of the marketing year. In particular, it is usually on the utilization side that any unbalancing element apparent in an active balance sheet has to be reconciled.

The utilization side of a historical balance sheet is made up of the following main elements:

- Domestic Utilization
- Exports
- Closing Stocks

Bearing in mind the need to reconcile any unbalancing element from an active balance sheet, it is best to deal with each of these three elements in a slightly different order.

5.2.1 Exports

Firstly, the simplest element to deal with is exports. As in the case of imports, a historical balance sheet should only record exports which have actually been shipped during the course of the marketing year in question. Any export commitments which failed to be shipped should therefore be ignored.

5.2.2 Closing Stocks

The next step is to verify the closing stocks figure(s). In an active balance sheet, closing stocks are usually a projected figure, even as the marketing year draws to an end. In the historical balance sheet, closing stocks should be an actual figure. What is more, they should be equal to the opening stocks of the following marketing year. Closing stocks are therefore determined in exactly the same way as opening stock (see previous chapter). In fact, the actual closing stock of a marketing year that has just ended can be determined at the same time that the opening stocks for the new marketing year are established.

5.2.3 Domestic Utilisation

Finally, having determined the individual elements that make up the supply side of the historical balance sheet equation and having also established two of the three elements that make up the utilization side of the equation; it is now possible to determine domestic utilization as the residual or balancing element in the historical balance sheet.

Of course, by this method of determining domestic utilization as the balancing element in the supply/utilization equation it is not, directly at least, possible to distinguish the various components of domestic utilization; food use, feed use and other uses & losses. If a more detailed picture of domestic utilization is wanted in a historical balance sheet, it is necessary to qualify the actual level of two of the three components of domestic utilization and make the third the balancing element in the historical balance sheet equation. In the case, one would normally try to estimate (or make an allowance for) actual feed use and actual other uses & losses and make food use the balancing element.

When preparing the year end reconciliation of a food balance sheet it is important to recognize that two elements which are contained in an active balance sheet no longer

play any role in a historical balance sheet. These two elements are desired monitored stocks and the import gap.

5.2.4 Desired Monitored Stocks

Desired monitored stocks are discarded in a historical balance sheet because they are merely a target and do not represent any actual stock. This, however, is no to say that Strategic Grain Reserves are excluded from a historical balance sheet. On the contrary, the actual level of the SGR at the beginning and end of the marketing year are implicitly included in the estimates of the opening and closing stocks. If desired, the SGR portion of the opening and closing stocks can be explicitly indicated in a historical balance sheet.

5.2.5 Import Gap

An import gap, which plays an important role in an active balance sheet, also looses relevance in the context of a historical balance sheet. The existence of an import gap in an active balance sheet at the close of a marketing year (when no further imports can be delivered) indicates that available supplies of food were not sufficient to cover the perceived needs for the year in question. As a result of this, one of three outcomes will have resulted:

- Closing stocks will be lower than forecast, or;
- Actual domestic utilization will be less than forecasted domestic requirements, or;
- Both

What ever the outcome, the import gap must be reconciled within a historical balance.

Figure 5.2: A Simple Historical Balance Sheet (000's tonnes)

Total Supply	**247**
Opening Stocks	57
Gross Harvest	166
Imports	24
Total Utilisation	**247**
Domestic Utilisation	189
Exports	12
Closing Stocks	46

Finally, a word of caution when it comes to making ex-post adjustments to a historical balance sheet: As indicated above, historical balance sheets are not totally static in the sense that from time to time one or more elements in them may need to be adjusted in the light of new information. For example, as suggested above, the opening stock figure may be adjusted or an official production estimate may only be released after

the marketing year has closed. If or when an adjustment occurs, it is important to recognize that this will trigger further adjustments in the balance sheet in order to maintain the equilibrium between the supply and utilization sides.

Figure 5.3: A More Detailed Historical Balance Sheet (000's tonnes)

Total Supply		**247**
Opening Stocks		**57**
of which: SGR	11	
On-Farm	46	
Gross Harvest		**166**
Imports		**24**
Commercial	19	
Food Aid	5	
Total Utilisation		**247**
Domestic Utilisation		**189**
Food Use	157	
Feed Use	12	
Other Uses/Losses	20	
Exports		**12**
Closing Stocks		**46**
of which: SGR	15	
On-Farm	31	

APPENDIX A:
CALCULATION OF MID YEAR POPULATION

A.1 The Equation

It is often useful when analyzing the results from food balance sheets to be able to express variables such as food use in terms of per caput amounts. In order to be able to do this accurately, the population size has to be determined correctly.

The correct definition of the current population level is the population at the **mid point** of the relevant marketing year (that is, the **average** population for the year in question).

The mid point population for a relevant marketing year can be determined if the following information is available:

- official estimates of **base year population**
- **reference month** of population census
- **mid-month** of the marketing year in question
- official annual population **growth rate**

The **base year population** could be the population level at the last census. However, often census reports include annual projections for the next 20 years or so. If such projections exist, the base year population could be taken to be the projection population for the year closest to the marketing year in question. For example, say that the marketing year in question is 1994/95; the base year population would be the projected population for 1994.

It is important to establish the **reference month** for any population census (that is, the month in which the census was carried out). The reference month for the census will also be the reference month for the official population projections.

The **mid-month** of the marketing year in question is easily determined from the definition of the marketing year. The mid-month of a marketing year that runs from April to March is September (or October – it makes little difference).

The annual population **growth rate** should be readily obtained from the report of the last population census.

The equation below can be used to calculate the projected mid marketing year population:

$$P_t = P_c \left[1 + \frac{r}{12}\right]^m$$

Where,

P_t is the mid year population for the marketing year in question;

P_c is the base year population;

r is the annual percentage population growth rate divided by 100, and;

m is the number of months between the month of the census and the mid month of the marketing year in question.

A.2 An Example

Suppose that we want to calculate the projected mid year population for the 1994/95 marketing year, and that we have the following information:

- The marketing year runs from April to March (mid month is, therefore, **September 1994**);
- The last population census was undertaken in **June 1986** and official projections were prepared for the period up to the year 2000;
- The official population projection for **1994** (June) is **11.27 million**, and;
- The official annual population growth rate is **2.63** per cent.

On this basis, we can estimate the values of variables in the equation:

P_c = 11.27 (million)

r = 0.00263 (2.63/100), and;

m = 3 (the number of months between June 1994 and September 1994).

Using the equation described above, the mid year population for the 1994/95 marketing year can now be calculated as follows:

$P_t = 11.27(1+ 0.0263/12)^3$

$P_t = 11.27(1 + 0.0022)^3$

$P_t = 11.27(1.0022)^3$

$P_t = 11.27(1.0066)$

$P_t = 11.34$ million

Finally, it should be noted that the value of the exponential **m** in the above equation could also be negative. If, for example, the relevant month for the base population in the above exercise were October 1994 instead of June 1994, then the value of **m** would be -1.

In that case,

$$P_t = 11.27(1+ 0.0263/12)^{-1}$$

$$P_t = 11.27(1 + 0.0022)^{-1}$$

$$P_t = 11.27(1.0022)^{-1}$$

$$P_t = 11.27/1.0022$$

$$P_t = 11.34 \text{ million}$$

APPENDIX B: CALCULATING STATUS QUO REQUIREMENTS USING A TREND PROJECTION METHOD

B.1 The Trend Projection Method

A useful procedure when preparing an active cereal balance sheet is to be able to project the value of a balance sheet element (such as gross harvest or domestic requirements) using actual data from historical balance sheets for a number of years immediately preceding the present.

Such a procedure is known as a trend projection. There are several of ways of projecting trends. The most appropriate method to apply will depend on the trend characteristic exhibited by a particular data set. Common trend types are linear and exponential.

The method demonstrated here is of the former, linear, type. The method itself is fairly straight forward and can be undertaken with the aid of a simple calculator.

The general equation for the method is as follows:

$$y = [(a_2 - a_1)/x]\, n + a_2$$

where,

y ~ is the projected value for the present year:

a_1 **~** is the average value of the first half of the historical data set;

a_2 **~** is the average value of the second half of the historical data set;

x ~ is the number of years between the mid points of the two halves of the historical data set, and;

n ~ is the number of years from the mid point of the second half of the historical data set to the current year;

This general formula can be greatly simplified if it is assumed that the trend projection will be based on a historical data set covering the last **six** years.

In which case,

x ~ will be equal to 3 years, and;

n ~ will be equal to 2 years.

The equation can therefore be simplified into the following specific form:

$$y = [(a_2 - a_1)/3]\ 2 + a_2$$

B.2 An Example: Projecting Status Quo Domestic Requirements

One of the most common uses of a trend projection method is to estimate domestic requirements for a current marketing year on the basis of historical data. The following example shows how gross domestic requirements for the current marketing year can be forecast using actual levels of domestic utilization over the preceding six years. This is referred to in the main text as the **status quo** approach.

Suppose that we want to project gross domestic requirements for the 1994/95 marketing year and we have the following data on actual domestic utilization levels from the historical balance sheets of the past six years:

1988/89	145,000 tonnes
1989/90	148,000 tonnes
1990/91	146,000 tonnes
1991/92	151,000 tonnes
1992/93	153,000 tonnes
1993/94	150,000 tonnes

Step 1: Calculate the average value for the first 3 years (a_1)

(145,000 + 148,000 + 146,000)/3 = 146,333 tonnes

Step 2: Calculate the average value for the second 3 years (a_2):

(151,000 + 153,000 + 150,000)/3 = 151,333 tonnes

Step 3: Calculate the change from the mid point of the first half of the data set to the mid point of the second half of the data set ($a_1 - a_2$):

151,333 – 146,333 = 5000 tonnes

Step 4: Calculate the average annual change between the two periods

$[(a_1 - a_2)/x]$:

(5000)/3= 1,667 tonnes

Step 5: Multiply the average annual change by the number of years from the mid point of the second half of the historical data set to the current year

{[(a_1 - a_2)/x]n}:

1,667 x 2 =3,334 tonnes

Step 6: Add this increment to the average value of the second half of the data set

{[(a_2 - a_1)/x] n + a_2 }

151,333 + 3,334 = **154,667 tonnes** (rounded to **155,000 tonnes**)

APPENDIX C:
CALCULATION OF NUTRITIONAL REQUIRMENTS

Introduction

This appendix describes, step by step, how to calculate **nutritional cereal requirements** for a given marketing year.

This method calculates the **food use** components of **domestic utilization/requirements** only. Other, albeit less significant, elements of domestic utilization/requirements, therefore, have to be added in order to derive **total** domestic utilization/requirements.

Calculating nutritional requirements involves four relatively straight forward steps:

Step 1: Calculate total annual per caput energy requirements.
Step 2: Determine what proportion of total annual per caput energy requirements are derived from cereals.
Step 3: Determine what proportion of annual per caput cereal energy requirements are derived from individual commodities (e.g. wheat, maize, etc)
Step 4: Convert commodity specific annual per caput calorific requirements into grain amounts.

STEP 1: Calculating Annual per Caput Energy Requirements

Energy requirements are customarily stated in terms of **calories**.

Body weight and **physical activity** are the two prime determinants of energy requirements. Since children, adolescents and adults of different age and sex have different energy requirements, different age and sex groups have to be considered separately.

The estimation of the average requirement (**T**) of a particular age and sex group is calculated as: **T = BMR X PAL**, where **BMR** is the average basal metabolic rate of the group and **PAL** is the physical activity level of the group.

By breaking down the total population of a country into age and sex groups and then applying the group specific BMR and Pal values, an average per caput energy requirement for the country as a whole can be calculated.

Although, the average per caput energy requirement for an individual country can be calculated from first principles using the above method, the process is somewhat time consuming. Therefore, as already mentioned in the main text, the pre-established

country specific average daily energy requirement levels given in **figure 4.1** (may also have to check with nutritionist in your country) can be applied directly.

Multiplying the average **daily** per caput energy requirement by 365 days gives the average **annual** per caput energy requirement:

Example: *2,054 calories/person/day X 365 days*

= 749,710 calories/person/year

STEP 2: Determining the Proportion of Energy Requirements Derived from Cereals

Although cereals supply the bulk of human energy requirements in most SADC countries, energy is in fact obtained from all types of food. Indeed, for some population groups within SADC countries non cereal staples such as cassava, plantains and sweet potatoes, play an important role in satisfying energy requirements.

For this reason, it is necessary to estimate the amount of energy that is supplied be cereals themselves.

Sometimes, a food consumption survey or other study may have been carried which defines the percentage of energy, in an average diet, which is supplied by cereals. If in-country data is not available, the proportion can be derived from the **FAO Standardized Food Balance Sheets**, which are published annually for each country and which should be available at all FAO Representations.

By multiplying total annual per caput energy requirements by the proportion (percentage) of energy supplied from cereals, the number of calories (energy) derived from cereals can be obtained.

Example:

Assuming cereals account for 75 per cent of total energy intake in the human diet, the number of calories derived from cereal can be calculated as follows:

749,710 calories/person/year x 75 per cent

= 562,282 calories/person/year

STEP 3: Determining the Proportion Cereal Requirements derived from Individual Cereal Commodities

Cereal balance sheets normally specify a number of individual cereal commodities (maize, wheat, sorghum, etc). It is therefore not sufficient to know how many calories will be required from the cereals as a whole. More precision is required and it is

necessary to determine how much energy will be required from **each cereal commodity** listed in the balance sheet.

The relative share of each cereal commodity can be determined by reviewing apparent consumption patterns in the past years, as indicated in the **food use** line in recent **historical balance sheets**.

Since consumption patterns change over time, it is suggested that this analysis be based on the preceding **three years**. The average food use over the preceding 3 years should first be calculated for each commodity, then, the relative **percentage share** of each commodity can be worked out. Finally, each cereal commodity's percentage shared can be multiplied by the total number of calories derived from cereal as a whole to obtain the **number of calories derived from each commodity**.

Example:

Suppose, the following data on actual food use has been obtained from cereal balances of the preceding three years:

	91/92	92/93	93/94	Ave	%
Maize	89,000	91,000	95,000	91,666	49.0
Wheat	26,000	22,000	28,000	25,333	13.5
Sorghum	67,000	72,000	71,000	70,000	37.5
Total	182,000	185,000	194,000	187,000	100.0

The number of calories required from each cereal commodity can be calculated by applying the percentage to the number of calories required from all cereals, as follows:

Maize	562,282 x 0.490 = 275,518 calories/person/year
Wheat	562,282 x 0.135 = 75,908 calories/person/year
Sorghum	562,282 x 0.375 = 210,856 calories/person/year

APPENDIX D: QUANTIFICATION OF ROOT CROPS IN NATIONAL BALANCE SHEETS

D.1 Introduction

In order to meaningfully include root crops into the National Food Balance Sheet, it must be possible to compare and **aggregate** root crop commodities with other commodities in the balance sheet. In general, this requires quantification at two levels. The first is the conversion of the **difference forms of the same commodity** into one form so that aggregation can be done. The second quantification allows **comparison and aggregation across all commodities** in the balance sheet, accomplished by converting all commodities into a **single base commodity** using food energy values.

D.2 Standardisation of Different Forms of the Same Commodity

This is achieved through several procedures depending on the form of the commodity when the data is collected.

D.2.1 Wet Vs Dry Weight

Data on cassava production and stocks are usually collected when the crop has high moisture content, as the crop is normally stored underground and only harvested when the need arises. When estimating production, for example through a sample subplot, it is normal to convert the wet weight to dry weight. This may be achieved by, first determining the **moisture content** (using a moisture meter) of the fresh cassava and then using the following relationship to obtain the dry weight:

$$\textbf{Dry weight} = (\textbf{wet weight} \times 100 - T) / (100 - D)$$

Where, T = percentage moisture content of the fresh cassava,

D = predetermined percentage water content of dry weight matter.

Alternatively, dry weight can be determined by allowing the harvested tuber from the subplot to dry in the sun. The dry weight is then realised once the weight becomes **constant and no longer changes after further drying**.

In most cases, however, the wet weight tonnage is typically deflated in a straight-forward manner using a **predetermined rate** to come up with dry weight tonnage. For example, in Malawi the dry weight cassava is assumed to be 30% of wet weight. Hence once the wet weight tonnage is known, say 20,000 tonnes, the dry weight are found as follows:

Dry weight = 20,000 × (30%) = 20000 × 0.3 = 6000 tonnes.

D.2.2 Whole dry cassava Vs cassava flour

The National Food Balance Sheet typically includes only one aggregate figure for 'production', 'stock', 'import', 'export' and so on under each food item. However, data, for example on stocks, may be collected in the form of whole cassava, cassava flour or other processed products. One cannot just add the weight of these different forms of cassava to come up with 'total stock' of cassava. The **different forms of cassava** have to be converted into one form before adding them up to determine the total stock, as the same weight of the **different forms of cassava have different food values**. For example, one kilogramme of cassava flour has more calories than the same weight of whole cassava, and therefore aggregating the two forms without due consideration would not be correct.

Within the SADC Early Warning System, the established convention is to measure cassava in terms of unmilled dry amounts of cassava, just as cereals are measured in terms of whole grain (except for rice, which is expressed in milled amounts rather than paddy). This, therefore, means that data collected in the form of flour is converted into whole grain for cereals and unmilled dry amounts for cassava. The conversion is done using milling extraction rates, defined as the percentage of the whole grain /unmilled dry amount remaining after the milling process. Some standard extraction rates in use in the SADC region, as also indicated in **Figure 3.1** above, are as shown in Table D.1 below:

Table D.1: Milling Extraction Rates[1]

Derived Commodity	Extraction Rates (%)
Maize meal	80-95
Wheat flour	72-80
Sorghum flour	80-95
Millet flour	80-95
Paddy	65-75
Cassava flour	25-33 wet 75-80 dry

Source: FAO and SADC

The extraction rates for dry cassava of between 75% to 80% means that a 100 kilogrammes of whole dry cassava would, after milling, would be converted to between 75 to 80 kilogrammes of cassava flour (or an average of 77.5 kilogrammes).

Example: 50,000 tonnes of cassava flour would be converted to the whole dry cassava equivalency as follows (using an average extraction rate of 77.5%):

Whole dry cassava = 50000 × (100/ 77.5) = 64,516 tonnes.

Similar standardisation should be carried out on processed products of root crops as well as cereals. Currently, however, SADC countries only make use of grain equivalents of processed cereal products, as insignificant processed products of root crops are available.

D.3 Conversion to a Base Commodity[2]

Converting the root crop into one form (flour to whole cassava) is a start, but may not be enough if the commodity is to be included in a balance sheet with other food commodities, where aggregation and comparison is done across commodities. This is

[1] Country specific extraction rates may be used where available/ or grain equivalents for processed products. .
[2] Most countries within the SADC region do not, however, convert commodities into equivalent amounts of base commodity. One reason for this is that food energy values (fev) of most cereal crops are quite close to each other. Similarly, as can be seen in Table 3.1 the fev for dried cassava is also very close to the cereal commodities.

because an equivalent weight of different food commodities (say, cassava and maize) does not necessarily contain the same amount of energy and, therefore, it is not strictly correct to add them up on a simple tonnage basis.

Accordingly, it is more accurate to convert all commodities in the balance sheet into equivalent amounts of a predetermined base commodity using **food energy values** (fev). The base commodity is normally the dominant food commodity in the balance sheet. In the case of the SADC region, the dominant food crop is maize and, therefore, all other food items in the balance sheet are converted into maize equivalents. Table D.2 shows food energy values of the most important food staples in the SADC region.

Table D.2: Food Energy Values (fev)

Commodity	Kcal/Kg
Cereals:	
Maize	3,570
Wheat	3,320
Rice	3,630
Sorghum	3,450
Millet	3,410
Non-Cereals:	
Cassava, flour	3,550
Cassava, dried	3,180
Cassava, fresh	1,490
Sweet potatoes, fresh	1,210
Cooking Bananas	1,530

Source: FAO and SADC

The conversion from one commodity to the equivalent amount of the base commodity using the food energy values is fairly easy and is done by **multiplying the number of tonnes of the commodity to be converted by its own food energy value, and then dividing by the food energy value of the base commodity**.

Example: Suppose the base commodity is maize (fev = 3,570) and the dry cassava (fev = 3,180) amount of 7,000 tonnes is to be converted into maize equivalent. The calculation would be as follows:

Cassava maize equivalent = [7,000 × 3,180] ÷ 3,570

= 6,235 tonnes.

The 6,235 tonnes would then be the amount going into the cassava column under the relevant row item; be it production, stock or any row item for which the calculation was done. Once the conversion is done for all commodities included in the balance sheet, it is possible to do cross commodity assessment, and cross substitutions of one deficit food item by the surplus commodity.

D.4 PROBLEMS

While the quantification of given root crop data into a balance sheet may be fairly easy, there are however, some problems in the overall procedure that must be considered for a meaningful interpretation of the balance sheet.

D.4.1 Reliability of the Data

The food balance sheet is a tool used to analyse the overall food supply and demand for a given period within a given country or region. The balance sheet relies on collected basic data on population, supply and demand of different foods and their nutritive values. As is always the case when analysing data, the **analysis can only be as good as the data itself**. The method of data collection, therefore, becomes very important as it usually has a direct impact on the quality of the data.

Unfortunately, current methods of data collection on root crops within the SADC region are quite questionable. Most, if not all, SADC countries currently do not employ statistical methods of collecting production, stock or other necessary data on cassava or other root crops such as sweet potatoes. Wholly subjective or partly objective methods, such as crop reports from extension services, with questionable reliabilities, are currently employed to collect production data.

Mostly due to this problem, SADC regional food balances do not give due emphasis to the production and utilization of root crops, although it is generally acknowledged that root crops and other food commodities are very important in the region.

D.4.2 Unavailability of Country Specific Conversion Rates

Countries within the region do not have country specific milling rates to convert flour of the various commodities to grain equivalent or dry whole cassava. Using FAO extraction rates may not be suitable for a given country. Even within each country, extraction rates are likely to be different among different milling practices, say among commercial, small scale or household practices.

D.4.3 Substitutability of Root Crops for other foods in the National Food Balance Sheet

Root crops are generally very bulky and are therefore mostly eaten locally where they are grown. Although part of the problem may have something to do with taste, especially among households in the SADC region whose main staple is maize, the main problem why root crops and in particular cassava are not easily moved from surplus areas to deficit areas is the bulkiness of the crop and the fact that, at the moment at least, the crop is best stored underground and not in any other storage facilities. Within the SADC region, this is also complicated by the fact that most cassava growing areas, for one reason or another, have very poor roads. Hence, when quantifying and aggregating cassava and other root crops in the National Balance Sheet, one has to bear in mind that surpluses in one area may not substitute deficits of other food commodities in another area of the country.