Workshop on
Methodology for the Compilation of
Supply Utilization Accounts and Food Balance Sheets:
Challenges and Proposals for Improvement
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Food Balance Sheets produced by the Food and Agriculture Organisation of the United Nations

A Methods Review and A Way Forward

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produced by the

Food and Agriculture Organisation of the United Nations

A Methods Review

and

A Way Forward

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Food Balance Sheets – A Methods Review

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INTRODUCTION

BACK

The purpose of this paper is to present an analysis of the Food Balance Sheets produced by the Food and Agriculture Organisation of the United Nations (FAO). The intent is to first explore the fundamentals, including the drivers behind the FAO agriculture statistics program and the theory underlying balance sheets. Next, a look at the current FAO methods will be carried out at a fairly high level, including a presentation of the strengths, weaknesses, opportunities and threats associated with the current program. Issues will be identified and discussed before options and recommendations are presented.

The author would like to acknowledge the contribution of a wide range of staff within both the Statistics Division and other work areas that represent data users. Numerous staff have taken the time to explain their work, their perspective and the need for the data. Given the short time frame for the project, their input has been invaluable, their expertise appreciated and their openness welcome. In particular, David Marshall, Deputy Director of the Global Statistics within the FAO Statistics Division endeavoured to meet with various groups having an interest in the statistics program. To keep the project on track, he provided insight and pointed out avenues that required investigation at the same time as being careful to ensure that the outcomes of the work remained independent. Also, Mike Trant, a former employee of both the FAO and Statistics Canada, provided useful background, including several documents that found their way into this report.

The document itself might be a little long but it is an important subject in the eyes of the FAO that warrants a serious review. The knowledge of readers is variable and some may find portions of the paper simplistic or unnecessary depending on their background. To be efficient and avoid redoing what others have done, some parts of the document have been borrowed from other documents. The paper can be used for reference purposes and is 'hyperlinked' to allow for easy navigation when viewed online.

SUMMARY

BACK

The basic purpose of this report is to examine the Food Balance Sheets produced by the FAO and offer suggestions to enhance the program. To accomplish this, the fundamental drivers were investigated, followed by a review of the FAO program before putting forward several recommendations.

There are three basic fundamentals that were considered in this exercise. The first point to note is that the agricultural and food balance sheet program is crucial to the ultimate goals of the FAO as an organisation. In addition to being used directly internally, other work areas add value to the data, often using the information as a basis for further analysis or projections. Importantly, it is used around the globe by a multitude of different users.

The second fundamental relates to the theory supporting balance sheets, which go by different names and have an array of different uses and formats. Essentially, the balance sheet is a stock and flow statement starting with beginning stocks and adding flows-in such as production or imports. From this, imports and other uses are removed before ending stocks are accounted for. In the case of food balance sheets, the food available for consumption is normally residually derived. There are a couple rules such as total supplies equal total disposition and the ending stocks of one period equal the beginning stocks of another.

The final fundamental relates to the characteristics typical of good statistical programs. The goal of a worthy program is to produce data that are relevant, reliable and timely. Reliability involves not only accuracy but the objective production of any statistics, meaning that they must be repeatable and free of politics.

The methods at the FAO utilize a balance sheet framework at the commodity and country level for each calendar year. In turn, the commodities are associated with a 'tree' structure depicting the primary commodity and several levels of processing. There are often numerous foods estimated at different levels of processing to produce a published estimate.

The balance sheets account for change in stocks instead of actual stock levels. In fact, an increase in stocks is considered negative as it would not be available for food consumption. The flows are accounted for in terms of production, trade, feed, seed and industrial use distributing from aggregated levels to lower levels of processing using a multitude of extraction and distribution ratios. Data sources include country level questionnaires, trade statistics data bases and data sets often produced by the country in question.

Food availability, often estimated at a processed level, and its derived variables such as calories (per person per day) are summed back up to the published level. Food available is usually converted to an equivalent of the item being published, if need be. For example, wheat is processed into various products. Food available is expressed as a wheat equivalent although it is derived at the processed product level. The truth is that the commodities often do not balance (supplies versus utilization). Although the balancing factor varies with the items being estimated, the change in stocks is often used as a balancing factor.

The report discusses some of the issues. The commendable program that results in the publication of balance sheet data for some 96 commodities independently by country and year starting in 1961 and currently running to 2003 is overwhelming. There is a vast collection (908) of commodities or processed products that are accounted for in the working files.

The report notes that in many ways the program is theoretically consistent but that, in practice, this strength is undermined by the use of change in stocks as a balancing factor. Further, large amounts of data are imputed making it less reliable. There are a few other issues including the fact the current data are unusually out-of-date.

Resources too are an issue. Not unlike many statistical organisations, the FAO is under continual pressure to produce more, produce it better, produce it faster and to do all this with less.

The recommendations flow from the idea of letting the fundamentals determine the program. There are several recommendations.–the most important of which is to maintain, if not enhance and properly fund the program. It is simply too important to both the FAO and numerous users to do otherwise. There are several strengths inherent in the program that should be continued including maintaining it as a public data set, keeping the data on an annual footing, continuing to produce some data that are not directly required for the food balance sheets and including all countries to name but a few.

To improve the program and focus resources, it is recommended that the program be directed at the published data in that the only balance sheets worked with would be those that are used for the public realm. For the most part, the multitude of balance sheets for processed products would be cut unless they are published. Another important suggestion relates to putting the balance sheets on a defendable footing by working with stocks and not changes in stocks. This may mean having a separate item to account for statistical discrepancies.

These suggestions would ensure that the balance sheets are consistent with the theory while limiting the imputations required. Even so, it is recommended that some data gaps be accepted and that the analyses focus on the food available for consumption variable as opposed to all the components. Further, it is suggested that the program simply incorporate selected data that other credible organisations have produced, saving resources and limiting duplication.

The report recommends that the balance sheets be published within a year following the reference year, making public the release dates and revision schedule. There are other suggestions such as reviewing the commodities covered, enhancing relations with data providers or other organisations working with balance sheets and clarifying the naming conventions. In time, the organisation might even consider producing waste-adjusted data.

Despite some of the significant changes suggested, the impact on the actual numbers being released would be limited. There is not likely to be a shock to users because of coverage, presentation or substantial revisions. The promising program has been tried and tested in other countries. This reduces the risk to the FAO while ensuring the methods are internationally comparable.

The end result would be a food balance sheet program driven by fundamentals that remains relevant to the core business of the FAO; is consistent with the supporting theory; and, reflects good statistical practices. The food statistics data set would be as reliable as possible given the limitations of the statistical programs in countries around the world. It would also be timely. The outcome, consistent with other organisations, would be a respected, world-class program that staff and the FAO could stand behind.

FAO

The mission

Food statistics are crucial to the basic mission of the FAO, which at its core has the goal of improving food security or reducing malnutrition for those in need around the globe.

This is no easy task but in order for informed decisions related to food security or limiting hunger to be made, information is required. One of the most crucial sets of information relates to the balance sheets –a data set supplying statistics on the supply and use of numerous food commodities. In addition, an estimate of food consumption (actually food available for consumption) for all countries over time along with the nutritional equivalents related to energy, protein and fat are part of this data set and important when scrutinizing malnutrition around the globe.

In FAO's own words and available from its web site, are the following excerpts.

Achieving food security for all is at the heart of FAO's efforts - to make sure people have regular access to enough high-quality food to lead active, healthy lives.

FAO's mandate is to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy.

The Food and Agriculture Organization of the United Nations leads international efforts to defeat hunger. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information. We help developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices and ensure good nutrition for all. Since our founding in 1945, we have focused special attention on developing rural areas, home to 70 percent of the world's poor and hungry people

Putting information within reach. FAO serves as a knowledge network. We use the expertise of our staff - agronomists, foresters, fisheries and livestock specialists, nutritionists, social scientists, economists, statisticians and other professionals - to collect, analyse and disseminate data that aid development. A million times a month, someone visits the FAO Internet site to consult a technical document or read about our work with farmers. We also publish hundreds of newsletters, reports and books, distribute several magazines, create numerous CD-ROMS and host dozens of electronic fora.

The use BACK

The use of FAO statistics is impressive. The numbers find their way around the globe in traditional publications and through FAOSTAT, an electronic data base available through the Internet. This base has data from 1961 to present for some 210 countries in a multilingual format. There are about 3 million time-series covering a range of domains on agriculture (production, consumption, trade, prices and resources), nutrition, fisheries, forestry, food aid, land use and population.

The site enjoys some 3,000 visits a day from users who download 50 million records daily. Although, the data associated with the balance sheets is not the only data provided on the site, it has been identified as an important data set by various types of users.

A recent evaluation of FAO's role and work in statistics noted that internationally "several institutions provide agricultural, forestry and fisheries data, including universities, the industry, private organizations and national governments. None, however, provide global statistics in such a wide range of areas as FAO. Heavy use is indeed made of FAO databases internally within FAO itself to produce analysis, 'state of' publications, and projections. FAO's global statistics are quoted continuously and used externally in global analysis by academics, research institutions, governments and the private sector''.

The same study further states that, "the statistics user community vests a certain amount of confidence in the FAO Statistics Programme as a global unbiased body of reliable and relevant statistics. The Evaluation Team confirmed that, generally, users value FAO data, for use in the conduct of their work and for decision making".

Data requirements

The draft, *Global Strategy to Improve Agriculture Statistics*, also pointed out the relevance of the food balance sheets. To quote from the strategy, "while many think official statistics are mainly required for policy purposes, there are other uses that need to be considered. For example, when decisions are made about initiating a particular activity to promote rural development, there should be a process to monitor and evaluate the progress with the capability to make corrections. Decisions to invest, either by the public or private sectors first depend upon data to justify the decision as well as monitoring and evaluating progress and results. A third use of data is to ensure markets operate efficiently. In many cases, the same data required for policy making also are needed for investment decisions and marketing purposes. The next three paragraphs outline the traditional data requirements and respective indicators; even these are not being produced by many countries, or are of poor quality needing to be improved".

Supply and utilization of agricultural products

"The starting point is the traditional and fundamental requirement for statistics on crop, livestock, and aquaculture production. These need to be viewed in the context of the supply utilization accounts and food balances which provide comprehensive pictures of the country's food and other commodity supplies during a specified period. The data required are production, imports, and stocks on the supply side and utilization for food, feed, seed, quantities exported and amounts available for food. These provide an overview of the matching of food availability with food use, or for non food products a fundamental matching of supply and demand".

Early warning

"Natural disasters such as storms and droughts can cause serious disruptions in food supplies and also distort prices. Either insufficient food is available and/or so expensive the poor cannot afford to purchase them. Early warning takes another turn when supplies either become unavailable or prices too high because of economic situations or policies taken by some one else. The food price crises following the increased use of food products for fuel is a

good example. National leaders need to be informed of these problems so that actions can be taken before it becomes too late to take corrective actions".

Efficient Market System

"Effective marketing systems depend upon information on supply and demand and that all participants in the marketing system have equal access to the information. The marketing system needs to be considered in the broader sense to include markets for inputs and those involved at every stage of the chain from production to final delivery to the consumer".

Statistical data use

In an FAO report, Statistics in FAO, a review of the use of FAOSTAT, the public data set that contains an array of agricultural data, was commented on. It was stated that, "FAOSTAT data is used internationally for preparing and publishing economic reports and even for meeting criteria for food aid from donors (FAO food consumption data, for example, are set as criteria for qualifying for food aid). At least 20 of its indicators are used in international collections of global economic monitoring and are referred to in leading international journals and business publications".

"There are countless FAOSTAT users in FAO itself thus a significant aspect of *Statistics in FAO* is the wide use and repackaging of data intra-FAO. In fact, the use of agricultural and economic statistics permeates all quarters of FAO starting with the Office of The Director General. The Statistics Division data sets are used for all official speeches and reports and such documents are checked by the Division. As well special statistical summaries are prepared for the Director General. Economists throughout the FAO use the data for their economic reports while staff use the information to compile project documents particularly in completing the 'background' section of project documents. One important input of the data is for, *World agriculture: towards 2030/2050*. In this case, the whole data set is taken up and used as model input".

"The Animal Production and Health Division, as well, use FAOSTAT data in their livestock (GLIPHA) database. The Nutrition and Consumer Protection Division as well are big users of the data sets especially food consumption and intake data. Trade and Markets Division, who also generate and provide data, uses (the FAOSTAT database) data as baseline data for projections and current market analysis. In this case, across the House, data providers are as well data users".

To sum it up

Internally, several groups add value to the balance sheet data as it flows to research and analysis that is used internally and externally. The numbers are used to as a foundation for long-term projections and short-term outlooks. Nutritionists use the data as a base to develop country nutrition profiles analysing trends in food supply and food availability. The total calories for a country estimate is integral to a calculation that helps determine the number of people who are undernourished.

It is safe to say that the food statistics associated with the balance sheets represent a set of data that are crucial to not only the FAO and its essential mission but to users around the globe. The organisation enjoys the status of being viewed as a credible organisation producing

credible statistics, despite the fact that it is not a statistical organisation. The food balance sheets are relevant. The data are needed, directly or indirectly through value-added analysis, by a multitude of analysts and decision makers.

The Theory Behind Balance Sheets BACK

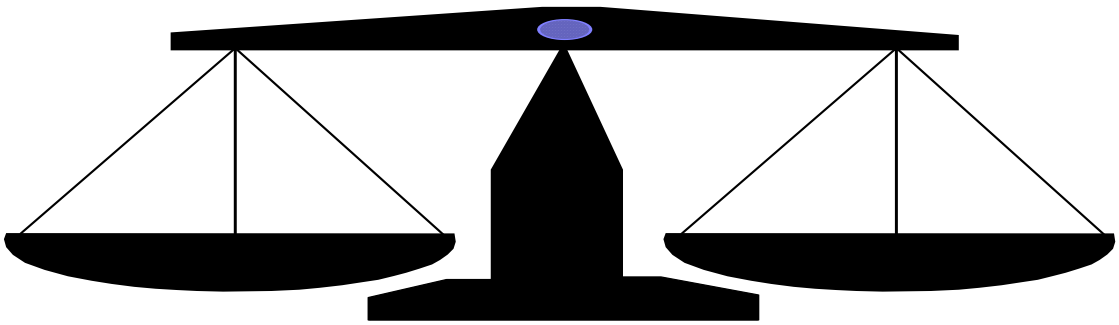
The balance sheet is a traditional tool used to integrate data related to agriculture or food commodities. Numerous organisations that work with these statistics, from governments to the private sector to international organisations such as the FAO, employ the tool. Even so, it is applied with different purposes in mind.

Just to clarify the terminology at the beginning, the FAO is working with "agriculture and food commodity supply and use balance sheets". As this description is too long for a title, all organisations use shorter forms such as supply-demand, supply-disposition, supply-utilisation or supply-use tables in addition to the term balance sheets. Although different organisations may use different naming conventions, they are fundamentally the same and for the purpose of this article can be viewed as synonyms.

In essence, the balance sheet is a mathematical portrait of an agricultural or food commodity over a period of time for a defined geographical level. It is a stock and flow statement. The stocks are similar to a snap shot at a point in time, whereas the flows occur over a period of time. Hence, production or trade data represent types of flows.

This portrait will account for the stocks at the beginning of a period of time and combine that with flows in to equal total supplies. The same display will account for the use of the supplies that combined with stocks at the end of the period will equal total disposition.

Although it may be obvious to experienced users, two principles to keep in mind are that total supplies and total disposition must equal. And, the ending stocks of one period equal the beginning stocks of another.



The time factor... BACK

When the balance sheet is developed for several time periods, the result is a time series of commodity portraits that are linked over time through stocks. Users are then able to compare the data over a longer period to put perspective on any particular year and to analyse change.

Virtually any time period can be chosen to display balance sheets. However, in practice and partially due to data limitations or limited resources along with the use of the data, they are often portrayed on an annual basis. As crop production can vary tremendously from one year to another, most users consider annual data as a minimum. This could be a calendar year or, as is often the case, a different year such as a crop year. Several organisations produce quarterly supply-demand tables and monthly tables are not unheard of.

Balance sheets can be used to display over time a picture not only of the time period they pertain to but of longer periods as well. If fact, it is an easy task to sum balance sheets by summing the flows and accounting for the stocks to provide a compatible portrait over a longer time period that might better meet particular users' needs. For example, quarterly balance sheets can be summed to derive an annual balance sheet.

Where is it? BACK

Geography is another option. The balance sheets are often developed at the national level, sometimes because of available date but they can be developed for any geographic area. The concepts can be applied to the entire world, regions that group selected countries, individual countries and below, such as the state or provincial level. This allows comparisons across different geographical boundaries including from one country to another. It is also possible to add different geographically based balance sheets together although great care has to be taken to properly account for of eliminate trade (or flows) within the group.

What is it?

And, what of the commodities? The concept can be applied to any commodity but this report will confine itself to agriculture or food commodities. It can be applied to primary commodities be it crops or livestock or it can be applied to processed food stuffs. Further, commodity groups can be combined to create totals such as a total for all fruit.

Different sectors can also be depicted. For instance, many balance sheets often combine both the farm and commercial level. But, these datasets can also be displayed separately to independently display the farm sector and the commercial sector. To accomplish this additional data such as producer deliveries may be required, although they cancel out when combined to show the larger picture.

So, now we have balance sheets defined for a particular time period, a certain geographical area and applied to particular commodities. There are more options.

How is it used?

One of the most important drivers behind balance sheets is their use. They can be used to present data to the public. A balance sheet of this nature may be fairly aggregated in that data

that may be a challenge to defend are often combined with other data to arrive at sub-totals that, in aggregate, can be defended.

Balance sheets are also powerful analytical tools. When used for analysis, additional components of the equation may be displayed because they add value but do not have to be publicly defended. If the components are known to be within a limited range, the tool can be used for confrontational analysis. Given situations where the total supplies and use do not equal, then the components can be challenged. It is this exercise that allows some agricultural statistical organisations to check data including survey based production or stocks, the results of which are displayed within the balance sheets. It is a tool often used to confirm or fine-tune major data sets. This is similar to techniques used for national accounting analysis.

It's in the details...

The level of detail is always an option and often governed by the purpose of the tables and available data. Theoretically, the data can be broken down repeatedly to finer sub-groups although, in practice this is limited. For example, beginning stocks might be broken down to farm and commercial stocks.

Table 1. Grain commodity supply and disposition table

	Region 1	Region 2	All regions	Commercial	National
			thousands of metric tonnes		
Beginning stocks					
Stocks on farms	1,200	2,200	3,400		3,400
Commercial stocks				7,800	7,800
Total beginning stocks	**1,200**	**2,200**	**3,400**	**7,800**	**11,200**
Flows in					
Production	9,800	16,300	26,100		26,100
Imports				200	200
Producer deliveries				21,900	
Total flows in	**9,800**	**16,300**	**26,100**	**22,100**	**26,300**
Total supplies	**11,000**	**18,500**	**29,500**	**29,900**	**37,500**
Flows out					
Producer deliveries	8,100	13,800	21,900		
Grain exports				21,000	21,000
Product exports				500	500
Seed requirements	400	500	900		900
Feed, waste & dockage	1,600	2,000	3,600	700	4,300
Human food			-	2,300	2,300
Industrial use			-	100	100
Loss in handling			-	100	100
Total flows out	**10,100**	**16,300**	**26,400**	**24,700**	**29,200**
Ending stocks					
Stocks on farms	900	2,200	3,100		3,100
Commercial stocks				5,200	5,200
Total ending stocks	**900**	**2,200**	**3,100**	**5,200**	**8,300**
Total disposition	**11,000**	**18,500**	**29,500**	**29,900**	**37,500**

Even more, the tables can be used to display data sets that are of interest but not required for the balance sheets. A good example of this is the inclusion of area, yield and production in a balance sheet that requires only production. If one hopes to analyse production it is crucial to understand the components of area and yield.

Table 1 is a sample balance sheet that displays an aggregation over geographical regions and sector levels. For practical purposes, statistical agencies would normally display the different types independently in a time-series format. Each organization has a tendency to standardize their balance sheets in a style that is appropriate for their situation. Also, terms like "flows in" would not be used explicitly. Flows within the defined sector, such as farm-to-farm sales within a defined geographical region, are not displayed in public releases because they are not required to balance supply and disposition and because the data either do not exist or are of poor quality.

The sophistication of supply-disposition balance sheets can range from "back of the matchbox" calculations to highly developed and automated models for commodities that use a balance sheet in conjunction with survey data and biological constraints, distributing "residual error" based on the quality of the input data. Even so, all such analytical tables must incorporate the fundamentals that underlie all balance sheets.

Last but not least –the residual BACK

Importantly, balance sheets can be used to residually derive a number that might be otherwise impossible or too expensive to obtain. This is the case with feed, waste and dockage (grain supply and disposition table) or food available for consumption. In the latter case, after accounting for beginning and ending stocks and all known flows, the residual is assumed to flow to food available for consumption as it is the only significant flow remaining.

An important feature of most supply-disposition tables is that they usually integrate data from many different sources, each with their own unique concepts, methods and data limitations. For the analyst who will likely work with survey data and administrative data, determining the error and attributing it appropriately is virtually impossible. Consequently, the analyst must decide whether to display the error, hide the error, or distribute the error. This is done using reasonable judgment based on experience and some knowledge of the inputs. Analysts usually have an indication of the quality of survey data, but they have less information and control related to the quality of administrative data. The fact that the different components of the integrated statement have different data limitations is a problem in itself, particularly when an item is being residually derived. And, the smaller the residual, the more serious the problem. If there is no compensating error, the quality of any residual calculation can be dubious at best.

The supply-disposition balance sheet is a powerful tool. In fact, it is so powerful and in such common use that it is an important tool used in price determination. When statistical organizations release data related to the production of agricultural commodities, there can be an immediate market response in terms of the price of that commodity. But the response is truly more because the supply and demand relationship as depicted in the balance sheet has changed. Production goes up, supplies are greater and there is downward pressure on prices.

Credible Statistics – guiding principles BACK

Credibility is vital to any respectable statistical organisation. Without credibility, the statistical outputs will not be used for decision making rendering the data and organisation irrelevant. Further, suppliers will be reluctant to spend time providing input data as it would not be viewed as a worthwhile use of their resources.

There are some characteristics that help define a credible data set. In a nutshell, it is important the statistics are:

- relevant -they are used to make decisions
- reliable -reasonably accurate and produced in an objective manner
- timely -vary depending on the data set

Relevant

It is imperative that any data set that an organisation produces, be it used internally or destined for public outputs, needs to be used for a purpose. The uses can be numerous but data are truly relevant when they are used to make decisions –and, the more important the decision, the more relevant. Referring to the FAO data set the question might be, how much more important can a dataset be than used in some way to estimate the need for food for hungry or starving people?

As with many data sets, they often have multiple purposes. They can be used directly, either internally or externally or they can be used by analysts who add value to the more basic numbers to fit a specific purpose. They can also be employed to provide perspective as background information or simply for interests sake.

Reliable BACK

Reliability not only means that the data are reasonably accurate or close to the truth but it also means that the data have been produced in an objective and scientific way. To be objective, the outputs must be free of any political or policy influence and should require very few interventions by the statistician to adjust to estimates. This means that the data outputs can, given the inputs, be produced in a way that is repeatable even though the people involved in the statistical production process are different. This does not mean that the data are produced or output blindly according to a recipe but that the methods are clear. It is also helpful if the data produced are associated with metadata to describe the information sets and indicators of quality to help guide users in the appropriate use of the data.

Data are often designed for specific purposes but users have a multitude of needs and will frequently use a data set for a purpose for which it was not designed. Sometimes, the producing organisation may believe that certain uses of the data are inappropriate. This may be because the use demands a very high quality set of data that is beyond the quality inherent in a particular public data set. Even so, the user may still use the data because it may be all that is available. Statistical organisations have the role of producing relevant, reliable and timely statistics. They should inform users about the quality of those statistics. They may advise users on the appropriate use of the data but they do not normally tell users how to use the data.

Timely BACK

Decisions by their nature are forward thinking. Decisions are made to direct an action in the future. It is therefore understandable that decision-makers need the most current information available to make the most effective decisions. In fact, many decision-makers truly need forecasts and use the past as an indicator of the future, either implicitly or explicitly through value-added analysis. Statistical organisations on the other hand are often conservative and cautious organisations. They shy away from being speculative or forecasting.

Although the Statistics Division of the FAO closely resembles a statistical organisation, the organisation has more than one group that uses the data as a base for forecasts. Both short term outlooks and longer-term projections are produced for internal and external use.

The need for timely data and the need to produce high quality data often conflict. Normally, there is a trade-off between time and quality, which many users understand. They are often less interested in the quality than the producers of the statistics. The solution for statistical organisations is to produce the most timely statistics possible given the limitations related to quality and resources.

With agricultural or food commodities, timeliness is particularly important for two main reasons. The first is that supply and demand are more dictated by the supply side of the coin than the demand side. The demand remains fairly stable as the number of consumers tends to edge up over time and does not fluctuate wildly from one year to another. For a group of people, their economic conditions and consequent ability to purchase food also tends to change very slowly. However, the supply side can change dramatically from one growing season to another. Weather conditions can have a dramatic affect on the production of most agricultural commodities even though some crops are irrigated or grown under glass, which tends to stabilise production. Of course, there are numerous variables that can affect production from type of seed to fertilizer or pesticide use to harvest conditions. But, production and consequent supplies of the vast majority of crops in the vast majority of countries can change dramatically from one year to another.

As most crop commodities are grown on some sort of a seasonal basis, the time period that is viewed as the most important is the year. Livestock tend to be produced a little more consistently but they depend on the production of feed and the output will fluctuate over the seasons. Many organisations will produce livestock data on not only an annual basis but on a semi-annual or quarterly basis.

To put it succinctly, many agricultural commodities, particularly crops, are seasonal in nature and this dramatically affects the supply of foodstuffs. Further, as the supply side can change dramatically, current data can be very difficult to estimate simply based on historical trends. Consequently, all countries have a need for current and reliable agricultural statistics on at least an annual basis to provide a picture of supply and demand. Basic economics tells us that supply and demand determine price unless there are other influences. In essence, the supply and demand of foodstuffs will determine the price that all consumers ultimately need to pay to obtain these basic necessities of life.

The second main reason is that numerous agricultural commodities have a limited shelf life and need to get to the consumer within a short time frame. This puts increased pressure on the need for current data.

And more... BACK

There are other aspects of sound data sets that are important. There is normally a public data set that is available in a format that users can access. More and more, access is electronic and the goal is to make sure that it is friendly if not intuitive. Also, the public data set is normally released according to a published schedule so that all users have fair access to the information at the same time.

Credible statistical organisations are confidential organisations. Individuals and businesses that supply data need to know that their individual information will never be released to the public or even internally such as to a tax agency of a particular government. Data providers need to have confidence that the data will not be used to harm them in some manner. Also, to respect fairness to all users, the public data sets are kept confidential until they are publicly released.

It is not unusual for a statistical organisation to focus on historical data. Events in the past can be measured, information about the future is speculative by nature. Focusing on the past allows the organisation to produce credible numbers. Some other users will take the basic historical data and working with some type of model, produce forecasts. Of course, given that it is impossible to forecast all of the factors, especially major turning points, estimates related to the future carry a high risk.

Unlimited Resources – conflicting demands

Demand for data is unceasing –there are continually emerging needs that require more, different and perhaps detailed data. But, data cost money and given that most statistical organisations have limited budgets, it is impossible to be all things to all users. Priorities must be set and a core, public data set defined. Unfortunately, as budgets around the globe are reduced, statistics suffer. Numerous countries, particularly the poorer nations, struggle to produce even the most basic data. On developed countries, agriculture is less recognised as economies expand largely because of the growth of other sectors.

As a consequence, statistical programs must balance the fundaments of relevancy, reliability and timeliness, all which cost money, with the fact that resources are limited and priorities must be set. This is no easy task.

THE WAY IT IS – CURRENT CONCEPTS AND METHODS

BACK

Conceptually, the food balance sheets produced by the FAO are designed to provide a portrait of the food supplies and use in all countries on an individual and calendar year basis over time. They are designed to allow the calculation of food available for consumption and selected nutrient equivalents on a per person basis. The result is the display of food supply and use patterns that can be summed to represent regions or, for perspective, compared to other countries over time.

The statistics in the food balance sheets contain both official and unofficial data. The food supply equals food production plus imports and adjustments for any change in stocks (includes a balancing factor) minus exports, minus any amounts fed to livestock, used for seed, processed into non-food products, or lost during storage and transportation. The per capita (per person) food supply is then obtained by dividing the food supply (net) by the population. Data on per capita food supplies are expressed in terms of quantity and also in terms of the energy content of food (k/calories) and protein and fat.

Waste in storage, during distribution and processing should also be taken into consideration as an element in the food balance sheet. Losses identified as waste normally occur as a result of inadequate storage practices, but also in cases where food remains unsold or there is wilful destruction of the product because of an imbalance between supply and demand. This is particularly true of perishable foods, such as fresh fruit and vegetables. Losses which occur during the processing of primary commodities into other food products are taken into account in the assessment of respective extraction rates to reflect the technology used in food processing.

The components

Production

In principle, production figures relate to total domestic agricultural production. It should be noted that these are not economic accounts in the true sense of the term. In many western countries, the focus is on production for sale in the marketplace as the accounts are based on economic accounting principles. But, the FAO's primary interest relates to total food supplies available for people. This means that all production is important, even if it is from a household garden. Hunting, fishing and gathering activities are conceptually relevant despite the fact that they may be almost impossible to measure.
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In practice the measurement and coverage of food that does not trade in the marketplace and supplies of food from "own" production including household gardens is limited. Unless otherwise indicated, production is reported at the farm level for crop and livestock products. In the case of crops, it is production after accounting for harvest losses. As a general rule, all data on meat are expressed in terms of carcass weight and data on fish are the weight of the catch. With only a few exceptions, production data relate to production during the reference period.

The primary vehicle for collecting production statistics is an FAO questionnaire sent out to all countries. Therefore, if official statistics are available, then they are used. National

publications are viewed as a secondary source of data. As the response rate is low in some regions, particularly developing countries, or a particular country's statistical program is simply not developed enough to provide the requested production data, they are regularly estimated by the FAO.

Trade –imports and exports

In principle, trade data represent information on imports and exports and include all trade both recorded and unrecorded. In practice, the statistics represent only official trade including food aid. For countries that do not compile trade data, their trade is based on information available from their trading partners.

The trade data represent all trade regardless of their end use, be it for food consumption or other uses such as feed, seed or industrial uses. The Statistics Division cooperates with other international organisations to exchange data. The main organisations of interest are Eurostat, the United Nations and the Organisation for Economic Cooperation and Development. Of the trade data on FAO databases, over 70 % is obtained through the exchange. Meanwhile, the FAO makes an important (30 %) independent contribution to the exchange by collecting and providing country level data.

The trade data are usually supplied to the FAO electronically from respondent countries. This requires that FAO staff access and search the information required. For the FAO, the data are not necessarily classified according to their needs; however, the data are often available in a timely fashion. Normally the trade data obtained are classified according to the Harmonised System (HS) codes used internationally as a standard way of classifying trade goods. The FAO translates the HS codes into a unique system before they are validated.

The major issue is the increasing lack of response from some countries, particularly developing nations. The good news is that much of the trade data can be derived (mirrored) using exports by country of destination data. It should be noted that data related to food aid is provided through the World Food Program.

The published data are annual with many of the 2008 input files input having been delivered to the FAO as of October 2009. The data are integral to the balance sheets and are released on FAOSTAT as part of that program and as an independent data set. In the words of FAOSTAT, "the TradeSTAT module provides comprehensive, comparable and up-to-date annual trade statistics by country, region and economic country groups for about 600 individual food and agriculture commodities since 1961". At the time of writing, TradeSTAT most current year was 2007.

Stock changes BACK

Conceptually, stock changes include government, commercial and farm held stocks. Limited statistical information exists on opening or closing stocks for many commodities in many countries, making stocks estimation complicated and imprecise. As a result, stock changes are often calculated at FAO to smooth the supply and utilization –in practice, they are used as a balancing factor and they may, in part, be calculated residually by first estimating food available for consumption. The stock change is then used to smooth the food available for consumption if this item appears unstable to the analyst. Even when data on stocks are available, this item is still used as a balancing factor, so to speak. If the item is partially

residually derived then it reflects not only stock changes but also all other statistical error in the food balance equation.

According to the FAO, a stock increase will reduce the availability for domestic utilisation. Consequently, increases in stocks are indicated by a negative sign and decreases by a positive sign.

Also, in the absence of information on opening and closing stocks, changes in this item are used to shift part of the production or supplies from the calendar year that a crop was harvested in to the following year, when it is more likely to be used domestically or for export.

This method used to estimate the change in stocks may in some cases lead to adjusting more than one variable and will be discussed later.

Total supplies

This number, which represents the amount of a commodity available for food and non-food uses is derived. The FAO has used three different calculations to obtain a measure of total supplies. They include:

1. Production + imports + decrease in stocks = total supply
2. Production + imports + changes in stocks = supply available for export and domestic utilization
3. Production + imports – exports + changes in stocks = supply for domestic use

Although the FAO has used all of the concepts of 'supply' at one time or another, the third formula is used for working and public balance sheets.

Feed

Feed is the amount of a commodity fed to livestock during the reference period, whether domestically produced or imported.

Technically, the amounts represent a quantity of an agricultural commodity which are usable as food but are fed to livestock. It should be remembered that feed only represents a portion of the feed consumed by animals as they also consume other feeds not usable as food, such as forages.

Seed

Seed is an estimate of the amount of the agricultural product set aside for reproductive purposes, such as seed, sugar-cane planted, eggs for hatching and fish for bait, whether domestically produced or imported.

Official estimates are used when they are available. When the data are not available, seed figures are estimated as a percent of production, as in the case of eggs for hatching, or by multiplying a seeding rate by the seeded area of the following year.

Food Processing BACK

The food processing item, also known as food manufacturing, is the amount of a commodity processed for food purposes and for which separate entries are provided for in the food balance sheets either in the same commodity tree or in another food commodity. This helps to maintain the concept of accounting for all foods once and only once and it maintains the links in the various levels of balance sheets.

Waste

Waste is an estimate of what is wasted at all stages of production from the point at which production or imports are first recorded. It includes dockage, waste in processing, storage and transportation up to the retail level. Waste from losses occurring before and during harvest is excluded. Waste at the retail level and in the household, such as cooking or storage losses are also excluded.

It should be noted that post-harvest losses at the farm level can be substantial for many grains in many countries. This is due to the fact that the grain is often stored at the farm level but the storage facilities on farms in many countries are inadequate. Losses of perishable foods in some countries can also be high because of inadequate storage and handling facilities during marketing, from packaging to transportation.

Other utilization

Other utilization is a miscellaneous category to account for all other uses not identified elsewhere. The use of oils and fats to produce soap is an example. These numbers may be estimates in the absence of official data.

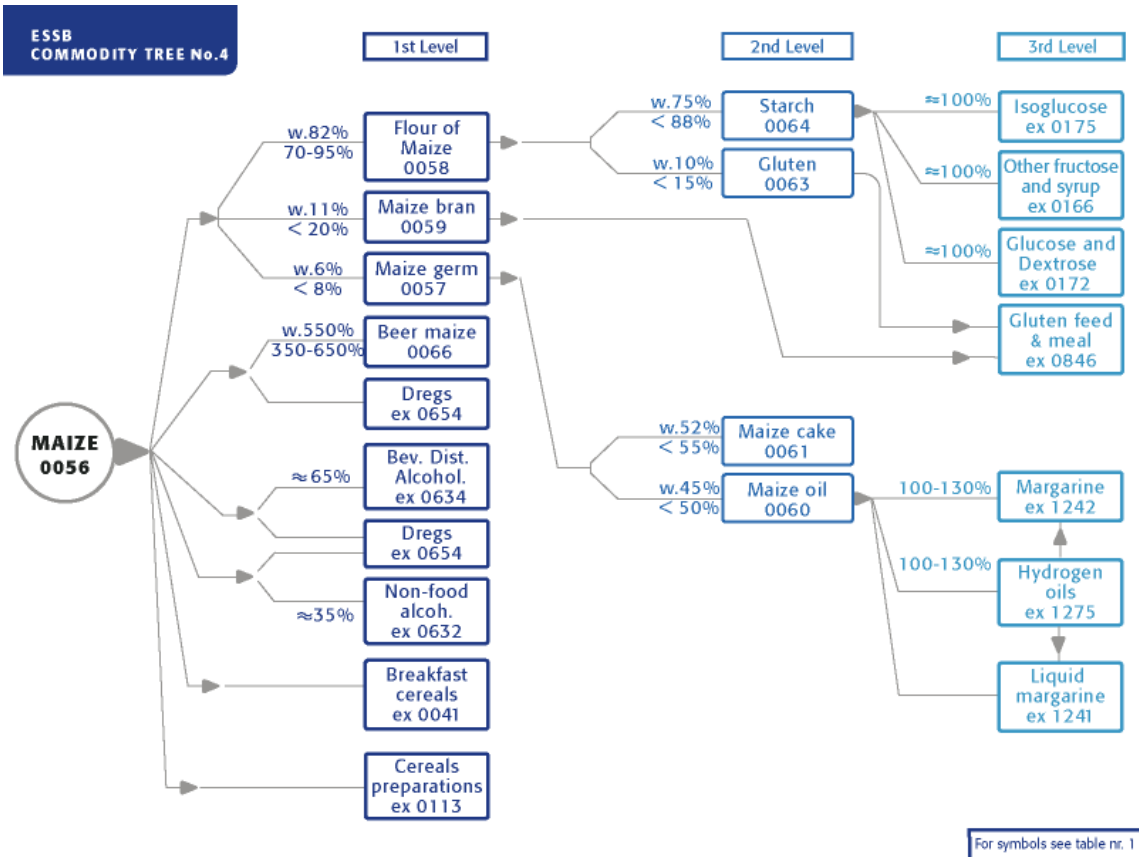
According to the FAO, statistical discrepancies are included in this category. The definition of a statistical discrepancy for this purpose is the imbalance between the supply and utilisation statistics. Consequently, this figure may represent a portion of any residually derived data.

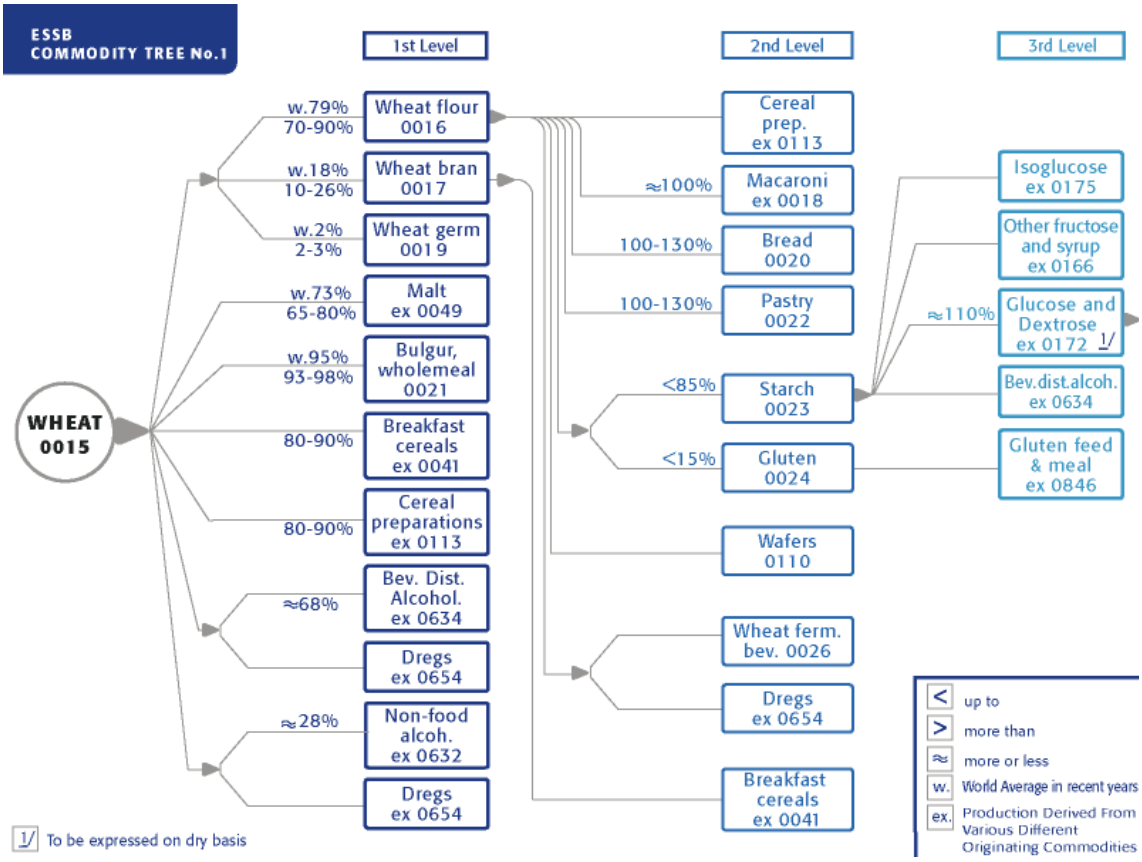
Food

Food is the total supply of all agricultural and derived products available for human consumption. Food available can be reported in terms of primary product equivalents such as wheat and milk or in the form that the products may actually be consumed, such as cheese.

The number reflects the total food available for human consumption. The work may be carried out at several levels (please see sample commodity trees below). There is the agricultural commodity level and then up to three levels of processing. In the case of maize, there are 10 categories for the first level (primary processing). Three of these categories are then broken down to a second level of processing of which there are 4 categories. And three of the second level items are broken out to a third level of processing. There are seven items at the third level. Most commodities have several levels of processing. Normally analysts work with numerous items that are not published. In this case, they must work with some 22 maize related items and two (maize and maize germ oil) are published.

Sample Commodity Trees





Analysts work at all levels of the data tree and input as much information as possible from several sources. Factors are often used to link the different levels of processing. There are numerous data gaps that require the analyst to estimate specific data, more often than not based on historical data.

Some of the data that are published are calculated directly in the balance sheets but the food available is treated differently. This item along with the related calculations is arrived at by working through the commodity tree to the lowest level possible for each item. The food available for use is calculated, associated with nutrient factors and summed back up to the total. Food available is expressed as an equivalent, such as grain equivalents.

It is relevant at this point to note that the quantities available for human consumption truly reflect only the quantities reaching the retail level or the consumer directly. The amount of food that is consumed will be significantly less. This is because of losses at the retail level and in the household, which includes storage, preparation, cooking, amounts fed to household animals and plate loss. Also, the cooking losses will affect the nutrients differently as nutrients can be more or less lost depending on the way that they are cooked.

Balancing the accounts BACK

The FAO builds the food balance sheets using statistics from official sources whenever possible. When no official data are available other sources of information may be used. The data gaps that still remain are estimated by imputation.

Many of the supply and disposition accounts constructed from available information will not balance. This is particularly an issue with the cereals but is prevalent in almost all of the FAO food balance sheets. The reasons for the imbalances are numerous but they can be classified into three general types. First, there are those that occur mainly in developed countries where there is no shortage of data, some of it from statistically sound probability surveys but the information is not always internally consistent. Those responsible for supplying the data may not always consult the same data source one year to the next nor always the most appropriate data source. Second, there are situations where the data are consistent but incomplete. Third, there are situations where there are both inconsistent and incomplete data.

Imbalances are defined as an inequality between supply and utilization statistics. Data problems are a major cause of imbalances. One solution to imbalances is to allow them to be recorded as stock changes, which are additions or withdrawals from stocks. However, 5 different items may be adjusted to help eliminate the imbalance. This includes, feed, waste, industrial use, food and change in stocks. The use of these items varies depending on the commodity. In addition, analysts can adjust various ratios although this would be done within established normal boundaries.

In practice, an analyst will work will several food commodities at once that belong to the same commodity tree in a particular country. The work is divided by country and analysts work with all commodities in each country. The working system appears to be very efficient in many ways. It is helpful that it codes each variable according to its source such as official, calculated, FAO estimate, balancing factor etc.

Although there are common threads, each commodity will use a different item as a balancing factor and the variables displayed to the analyst vary by commodity such that only relevant variables are visible. Many of the variables have been populated before an analyst works with a particular commodity. Analysts will update the data, confirm particular data points and balance the items using different variables.

An example might be useful (Please see the Table 2 below for a partial display of the working file). With wheat, food itself is not displayed but the balancing factor is Stock Variation. As we move through the tree, Flour of Wheat used Food as a balancing factor, Bran uses Feed, Macaroni uses Food, Wheat Starch uses Other Utilisation, etc. Different items are residual in nature and are used to balance the supplies and utilisation.

Table 2: Sample – selected portion of working file showing codes

Area Name	Item Name	Element Name	Symb_20
Country name	Wheat	Area Harv (Ha)	
Country name	Wheat	Production (Mt)	
Country name	Wheat	Imports - Qty (Mt)	*
Country name	Wheat	Stock Variation (Mt)	B
Country name	Wheat	Exports - Qty (Mt)	
Country name	Wheat	Feed (Mt)	
Country name	Wheat	Seed (Mt)	
Country name	Wheat	Waste (Mt)	C
Country name	Wheat	Processed (Mt)	
Country name	Flour of Wheat	Input (Mt)	/
Country name	Flour of Wheat	Production (Mt)	*
Country name	Flour of Wheat	Imports - Qty (Mt)	
Country name	Flour of Wheat	Exports - Qty (Mt)	*
Country name	Flour of Wheat	Processed (Mt)	F
Country name	Flour of Wheat	Food (Mt)	B
Country name	Bran of Wheat	Input (Mt)	/
Country name	Bran of Wheat	Production (Mt)	C
Country name	Bran of Wheat	Imports - Qty (Mt)	
Country name	Bran of Wheat	Exports - Qty (Mt)	*
Country name	Bran of Wheat	Feed (Mt)	B
Country name	Bran of Wheat	Processed (Mt)	C
Country name	Macaroni	Input (Mt)	C
Country name	Macaroni	Production (Mt)	T
Country name	Macaroni	Imports - Qty (Mt)	
Country name	Macaroni	Exports - Qty (Mt)	
Country name	Macaroni	Food (Mt)	B
Country name	Germ of Wheat	Input (Mt)	/
Country name	Germ of Wheat	Production (Mt)	C
Country name	Germ of Wheat	Imports - Qty (Mt)	
Country name	Germ of Wheat	Exports - Qty (Mt)	
Country name	Germ of Wheat	Food (Mt)	B
Country name	Bread	Input (Mt)	C
Country name	Bread	Production (Mt)	T
Country name	Bread	Imports - Qty (Mt)	
Country name	Bread	Exports - Qty (Mt)	*
Country name	Bread	Food (Mt)	B
Country name	Pastry	Input (Mt)	C
Country name	Pastry	Production (Mt)	T
Country name	Pastry	Imports - Qty (Mt)	
Country name	Pastry	Exports - Qty (Mt)	
Country name	Pastry	Food (Mt)	B
Country name	Wheat Starch	Input (Mt)	C
Country name	Wheat Starch	Production (Mt)	C
Country name	Wheat Starch	Imports - Qty (Mt)	
Country name	Wheat Starch	Exports - Qty (Mt)	
Country name	Wheat Starch	Processed (Mt)	F
Country name	Wheat Starch	Other Util (Mt)	B
Country name	Wheat Gluten	Input (Mt)	C
Country name	Wheat Gluten	Production (Mt)	C
Country name	Wheat Gluten	Imports - Qty (Mt)	
Country name	Wheat Gluten	Exports - Qty (Mt)	
Country name	Wheat Gluten	Food (Mt)	B
Country name	Breakfast Cereals	Input (Mt)	C
Country name	Breakfast Cereals	Production (Mt)	C
Country name	Breakfast Cereals	Imports - Qty (Mt)	
Country name	Breakfast Cereals	Exports - Qty (Mt)	
Country name	Breakfast Cereals	Food (Mt)	B

blank = official; B = balancing factor; C = calculated; F = FAO estimate; T = trend; * = unofficial figure from other organisation; and, / = automatic from process

It should be pointed out that the analysis is done fairly simplistically, partially due to the limited amount of available information coupled to time constraints. This results in a tendency to keep much of the data stable. For example, feed for a particular grain can fluctuate significantly depending on the price of that grain, the relative price of various feeds, the price of livestock, grain quality, or the availability of feeds including substitutes or fodder crops. In the FAO, the analyst may review the number of livestock and expect that feed would vary proportionately to this number. This occurs even if countries publish estimates of feed.

Estimates of domestic production, imports and exports are usually from official sources and as a consequence not normally subject to adjustment. The change in stocks variable is an attractive balancing item because estimates are not always available and they can be either positive or negative.

Per capita food availability

The food availability per person is estimated by dividing the available supply by the total population. The estimates are reported in terms of quantity, energy content (k/calories), protein and fat. To derive the nutrient equivalents, nutrient factors are applied. In many cases the nutrient factors are based on "100 grams of edible portion". As the food available per day is on an "as purchased" basis, an adjustment is made to account for the inedible portion. Per capita food statistics represent the average supply available for the population as a whole. They do not indicate the quantity actually consumed.

Population

The population statistics used in estimating per capita availability are the mid-year estimates published for each country by the United Nations Population Division. The exceptions are situations where the mid-year estimates do not reflect the population in the country for some particular reason. Exceptions are rare and are usually related to civil strife or a natural disaster that results in a massive migration of a portion of the population.

Population estimates normally incorporate adjustments wherever possible for special population groups such as refugees if their numbers are significant.

Food composition factors

In most instances agricultural products undergo some processing before they enter the household. Cereals, for example, are usually eaten as some type of processed product and not as wheat, maize or millet. As a consequence, energy values (k/calories), protein and fat content shown against primary commodities in the food balance sheets are derived by summing the calculated food composition of the processed products and not by multiplying a primary product, such as wheat, by the food composition factors of wheat.

Fish

It should be noted that food balance sheets related to fish are prepared by the FAO Fisheries and Aquaculture Department. The methods are fundamentally similar although they do differ in one important way. Fish are aggregated by species into 9 categories released on FAOSTAT. The data do not utilise a commodity tree structure that views primary food commodities and associated levels of processing. Stocks are used as an adjustment factor.

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) BACK

This section of the report will attempt to identify the strengths, weaknesses, opportunities and threats associated with the balance sheet. The purpose of this section is to simply list the items, almost as a quick reference. Many of the points will be discussed in the following section if they have not already been discussed.

Strengths

- Statistics in support of fundamental reasons behind the very existence of the FAO
- Multitude uses of data from long-term projections to criteria for food aid from donors
- International in perspective
- By country
- Multitude of commodities
- Long time series
- Only source of food balance sheets for numerous countries
- Balance sheet that displays key variables and supporting data
- Provides for the calculation of three nutrient variables (calories, protein and fat)
- An analytical tool for examining basic data (production and trade) at the country level
- Publicly available in both publications and on line through FAOSTAT
- Working system that appears reasonably efficient
- Internationally respected by the user community
- Method of calculation is sound in theory
- Related data (trade, production) has integral and independent value
- Some metadata exists and is available to users
- Staff are experienced and knowledgeable about their own work areas
- Numerous users around the globe have access to the same data set

Weaknesses

- Method of calculation, particularly stock change and estimation of total supplies, is unique and not consistent with other organisations. Stock change is truly a combination of stock change and a balancing factor.
- Method of calculating stock change is counter intuitive, not transparent (subjective), not based on sound statistical practices, inconsistent and confusing to the casual user leading to biased data
- Numerous data gaps are imputed (estimated)
- Results may not be consistent with some supplying organisations for the same variables
- Method of calculation is detailed, involving several levels of processing and array of coefficients that are dated.
- Indicators of quality are not available
- Data are not timely (most current data at September 2009 refers to 2003)
- Some countries may not know how to complete the questionnaire
- Some countries do not have the statistical program in place to support the food balance sheet programs
- Multiple sources of data with differing and unknown statistical error, both sampling and non-sampling

Opportunities

- Fine-tune the method of calculation and display of data to produce data by country over time that is more consistent with the theory and other organisations
- To improve the timeliness of both core and supplementary data
- To improve the usefulness of the data
- To fully account for all waste
- To utilise comparable accounts produced outside the Statistics Division

Threats

- Reduced resources are an ongoing threat
- Basic change may require a project management approach
- Projects that develop or change a program require resources, sometimes the most experienced staff, a champion, leaders, staff and organisational support, al of which may need to be developed
- Development projects cannot be conducted casually as 75% fail for numerous reasons
- Program change often results in staff change or the work of individuals that can meet resistance if there is not a buy-in to the basic project

The FAO is to be commended for developing a dataset that is crucial to its needs. The basic balance sheet layout is sound and consistent with the theory. The undertaking is almost overwhelming –to attempt to account for all food available to people around the globe on a country basis by food commodity. It is laudable that, when looking at the level of commodity processing detail, the FAO has attempted to work with the food statistics at levels that even the most established statistical organisations would not consider. Further, the FAO has had the courage to add value to its own data by applying nutrient factors to food available for consumption, thus making its own data more valuable to numerous users. Further, the FAO, which is not at its core a statistical organisation, is to be commended for publishing data that can be a challenge to defend. This helps to fill what would otherwise be a major void in the user community.

The organisation has had to deal with the fact that numerous countries simply have not developed their agricultural statistical systems sufficiently to meet the needs of their own country let alone the FAO. In a way, this is particularly true of the data that most interests the FAO, that is developing nations where survey response rates can be low. Further, much of the detail required for the different levels of processing are simply not available in most countries. In addition, because of the numerous sources of data and the nature of statistics, there is error in the system. Yet, fundamentally, the supply and use must balance. This has forced the FAO to impute a considerable number of data points and has led the organisation to use unique methods to balance the numbers and to work with residuals.

Despite the challenges, there exist opportunities to improve the program primarily by the letting the fundamentals discussed earlier guide any adjustments.

Readers should keep in mind that there are threats, particularly those associated with change. These threats should be accounted for in any plans to adjust the balance sheets.

ISSUES ASSOCIATED WITH THE CURRENT METHODS BACK

Commendable but overwhelming

It is commendable that the FAO has developed a very detailed and sophisticated method to produce balance sheets. Readers may recall that every commodity published has a "commodity tree" that may contain up to four different levels of processing. This means that there are many more commodities worked with than just the published commodities.

Following are some numbers to provide a little perspective. Please keep in mind that different people may derive different numbers but the conclusions would be the same. As mentioned, the food statistics are worked with using commodity trees made up of the primary or agricultural commodity (wheat) and normally associated with several other food commodities at different levels of processing (flour). There are 50 agricultural commodities that are organised as single independent trees and they are associated with 570 processed commodities to arrive at a grand total of 621 commodities. For example, wheat has 26 commodities associated with it at 3 different levels of processing. In addition, there are 64 agricultural commodities that are part of matrices and they have 223 associated processed commodities to total 287. In all, staff are working with some 908 agriculture or food commodities at different levels of processing.

The various levels of processing are connected to one another using proportions or ratios that represent the weight or the contribution of the product to the next level. There are also various processing factors that represent the yield of a particular product during processing. The links are complex and not easy to follow and it appears as though many were last reviewed and updated some time ago.

FAOSTAT available on the public web site contains some 263 single variables (162 crops, 19 livestock and 82 livestock products) under the section related to Supply Utilisation Accounts and Balance Sheets. This means that the FAO works with 908 variables while publicly releasing 263. However, many of these items do have complete data, particularly when looking at food available and its derivatives.

On FAOSTAT, the food balance sheets are available essentially on the basis of one country per year. This portion of FAOSTAT displays all of the components of the current FAO balance sheets up to 2003. There are 96 independent commodities along with numerous subtotals.

When looking at calories per person per day at the world level, some interesting observations can be made. Two commodities stand out as large. Not surprisingly, there is wheat at 19.3% in 2003 following by rice at 18.4%. These are the only two commodities that have contributions in the double digits. It requires 46 of the 96 food balance sheet commodities to account for the 95% of the calories available at the world level and 67 food types to account for 99% of the calories.

Some of the variables published might not be that relevant. Certainly, many of them might not be important to people in developing countries, where the FAO has a particular interest because of its mandate. Consequently, of the published data, many fewer categories are relevant than what is published. But, even the less relevant commodities require resources.

Large number of imputations BACK

If fact, it is probably safe to say that the balance sheets require so much detail to be input that it is beyond the capabilities of most countries, including western countries, to provide the this data. This problem is compounded by the fact that many developing countries have limited statistical programs to support even basic data. The approach of the Statistics Division is to fill the gaps as opposed to recognising certain 'cells' as data gaps, thereby leaving them empty. This results in a large number of imputations, meaning that a substantive number of the estimates are, at the very best, "expert opinions" not facts. Many might be difficult to defend. In addition, considerable time is required on the part of FAO staff and data providers as they attempt to collect the input data or find related data that might be useful to produce the estimates.

To further complicate the situation, when the data are being validated, the result may not make sense to the analyst. Although they may be correct, as agricultural inherently can exhibit wild variations, there will be a tendency for analysts to stabilise the data. This creates a quandary as the FAO staff do not necessarily have an intimate knowledge of all agriculture in every country. Given time pressures and communication challenges, it may be difficult to verify an unstable data set. If the FAO publishes a different data set than a country has supplied, it can be frustrating to countries and run the risk of alienating them. Generally, official data are accepted even if analysts recognise that the data are inaccurate.

But, despite the best efforts of analysts, the estimated data often lacks the quality that a statistically defendable data set requires. Thankfully, in many cases the estimates are performed for smaller items that have less impact on the final result. However, in developing countries that do not have a robust agriculture statistical program, imputations are required for even the basic data.

It should be recognised that some users exert pressure on the Statistics Division to fill the data gaps. They need the data. They need something to work with and some are less concerned with the quality of the data. After all, if the data are produced by the FAO Statistics Division, it must be somewhat reliable. The different perspectives can be difficult to reconcile. Sometimes, organisations in similar situations will produce estimates at an aggregated level, which will often be possible to defend. Normally, statistical organisations will only publish data that is defendable. They will recognise the data gap and, if it is relevant enough, put in place defendable measures to estimate the required data. All statistical organisations have data gaps.

Residual –love em and hate em BACK

Residuals are the calculation of a data set mathematically by subtracting one number from another number. They can be very useful as specific data can be estimated when there is not a direct source of information. For instance, with cereal crops, countries normally residually calculate feed, waste and dockage. Surveying for feeding statistics would be take time and be expensive.

With food balance sheets, the food available for consumption is normally residually calculated because there is no direct measure of this item or actual food consumption. Normally, a total supply is derived and from that all known uses and ending stocks are removed. Known uses might be items such as exports or industrial use. The result is a residual

and it is assumed that after accounting for all other uses, the remainder must be available for food consumption.

There are several limitations with residuals. The first is that they accumulate statistical error that is not compensated for earlier in the equation. This factor is important because, as an integration tool, balance sheets often utilize data sets from many different sources. They all contain different types and magnitudes of error. The second is that because residuals can be small numbers relative to the components, the error can be proportionately large. Consequently, a small revision to one of the components in percentage terms can result in a large revision to a residually derived number. These factors are sometimes ignored by providers and users of statistics but it is crucial for analysts who work with balance sheets to keep in mind. It is always important to recognise what the residual represents. Is it food available plus statistical error or does it include another component not accounted for such as industrial use or even feed?

Residuals are part of any balance sheet calculation (even if every component is measured) and the FAO is no exception. The residual appears to have an impact on five different numbers. It is used to estimate food available for consumption but it can also have an impact on other utilisation, feed, waste, and on the stock change number. It appears that the analyst may attempt to add value to the data by adjusting specific data sets to keep food consumption more stable. Frankly, the practice of distributing a residual to more than one component is high risk. But it is common practice for analysts to adjust data sets, including survey data, up or down within a range (sometimes defined by the survey quality for a particular item) as they determine what will be published.

The residual should often rest within certain parameters. However, the variations can be large when it comes to food available for consumption, primarily due to the impact of price change and the ability to substitute one food type for another.

Residuals can be very difficult to work with requiring a cautious and experienced analyst. For crucial numbers, sometimes a team approach is used to set estimates (National Agricultural Statistics Board) and these analysts will certainly be aware of any residually derived data.

Stock change –the link over time BACK

The FAO estimates stock change as opposed to the level of beginning and ending stocks. This is done because stocks can be used as a balancing factor, hiding some statistical error and because the stocks levels may not be available in numerous cases.

The estimation of stock change is consistent with the theory behind balance sheets. It is technically possible but level estimates have advantages over change estimates. First, level estimates allow the balance sheet to be linked over time as the ending stocks of one period must equal the beginning stocks of another period. This imposes some mathematical discipline on the balance sheets that adds strength to the overall portrait of any agricultural commodity. Second, level estimates are more transparent as analysts have a better idea of what the actual stock level is and change can be derived easily if need be. Third, level estimates are more intuitive than the way the FAO calculates stock change. To the FAO, an increase in stocks is viewed as a negative because if a food commodity is stored, it is no longer available for consumption. So, a positive change is viewed negatively. Some users might find that confusing. Fourth, level estimates are common in numerous other international

organisations producing agricultural statistics. Fifth, stock change can lend itself to bias in that the stock change could accumulate to unreasonable levels if the change does not even out over time. And finally, a change is in theory derived by subtracting one level from another and is subject to many of the same limitations as residually derived estimates discussed previously.

To put it more succinctly, if the objective of a balance sheet is to provide a simple mathematical portrait of an agricultural or food commodity, then it is important to ensure the portrait can be viewed clearly.

In fact, many statistical organisations that publish level estimates are very cautious when it comes to calculations of change based on their published data. This is because the change could be very small and represent a figure smaller than the error associated with the level indicators. It could just be all error. Second, a small revision to the larger level estimates could have a dramatic impact on the change indicator.

Alas, this is all true if the FAO was attempting to measure stock change. But, as discussed, this is truly a balancing factor and so is some unknown combination of stock change and balancing factor.

Once and only once BACK

Theoretically, it is possible to work at different levels in terms of the balance sheets, although the finer the breakdown, the less supporting data. Many commodities are not consumed directly and so it makes sense to provide some data, at least at the first level, of what is consumed. The balance sheets can be a tool to link the data. If balance sheets are not made available for an additional level of processing then the link is not required and should not made.

For example, wheat is not consumed directly but is normally first processed into flour. The wheat supply-demand table as a primary commodity is important to the FAO because there is considerable trade in wheat, including shipments to developing countries, where it may be processed.

The wheat supply-demand table could include an element called processing that essentially represents the major products processed in the first level of processing that are accounted for. The biggest ticket item would be flour. Then, there would be a balance sheet for flour that would be stated in its actual weight. The logical link is that the wheat supply-demand identifies the amount for processing. The nutrient factors would be developed appropriately and applied at the level the commodity is estimated at. In this case, it would be flour and represent some average that takes into account the numerous forms that wheat is further processed into.

An additional example might be tomatoes that are processed and canned. The processing in the primary commodity table would really account for tomatoes destined to be canned. Then, canned tomatoes would have a stand-alone balance sheet.

The concept is to attempt to account for all food once and only once. Then, nutrient factors can be applied at the appropriate level.

Confusion –outputs and naming conventions BACK

There seems to be a little bit of confusion when it comes to the naming conventions that are used by the FAO. Some of the in-house use of the terminology may not be clear to outsiders, particularly those working in a second language. This is simply compounded by any use of acronyms. For instance FAOSTAT, the public dataset available on the web uses SUA/FBS. The acronym stands for Supply Utilisation Account/Food Balance Sheets. Even knowing what the acronym means does not clarify if the two items mentioned are referring to something that is the same or different.

As mentioned earlier, the FAO is working with "agriculture and food commodity supply and use balance sheets". As this description is too long for a title, all organisations use shorter forms such as supply and demand, supply/disposition, supply-utilisation, supply-use tables or balance sheets. Although different organisations may use different naming conventions, they are fundamentally referring to the same type of statistical table.

It would be possible to use one term to refer to agricultural commodities such as supply and use tables (as done by the World Agricultural Outlook Board) and balance sheets to refer to food balance sheets. However, the distinction between agricultural commodities and food commodities is not always clear. Agricultural commodities refer to farm level production and food implies something that can be consumed or a level of processing. But, some commodities, particularly fruits and vegetables could fall into either category. To keep it simple and avoid confusion, it would be possible to simply use one term such as balance sheets.

FAOSTAT itself seems bewildering to the uninitiated in that relationships amongst the outputs are not clear. Even after reviewing the content of all of the categories, the logic behind the organisation of the outputs takes time to discern and is elusive. Thankfully, most users would be highly selective and may be less concerned with the organisation of the data sets.

Food consumption versus food availability BACK

Although the FAO refers to a data set as food consumption, it is truly food available for consumption. It is a derived number as opposed to a direct measure of food consumed that might be obtained from detailed and expensive food consumption surveys of consumers.

That being said, it is a valuable indicator of food available for consumption and it would be unreasonable to expect countries around the world to conduct food consumed studies on an occasional let alone regular basis. This is because of the high cost and heavy respondent burden associated with these surveys.

It would not be a shock to learn that users often believe that the FAO food consumption data are a good proxy for food consumed. In fact, food available is always higher and sometimes surprising higher than food consumed due to the waste at various points. This is because of losses at the retail level and in the household, which includes storage, preparation, cooking, amounts fed to household animals and plate loss. Also, the cooking losses will affect the nutrients differently as nutrients can be more or less lost depending on the way that they are cooked.

For example, in Canada, all foods available for consumption stood at 3,372 kilocalories in 2008 (per person, per day). Meanwhile, the waste adjusted, food available for consumption was significantly lower coming in at 2,382 –a difference of almost 1,000 kilocalories or 30%. In this case, the waste adjusted numbers are produced for some 27 nutrients based on food available for consumption (commodity level) and using waste adjustment factors. This is an easy operation to automate as the data are simply multiplied by the factors.

The same situation can be witnessed in the United States as well. All foods available for consumption rested at 3,900 kilocalories, per person per day. The number, when adjusted for losses, was estimated at 2,736 kilocalories, per person per day for a similar difference of almost 30%.

The advantage of producing waste adjusted data is that this data set is closer to what the user wants and often assumes they are getting –food consumed, also known as fork-level consumption. Users also have the advantage of being able to choose the data set they prefer to work with.

It should be pointed out that in terms of understanding food consumed; the derived food available for consumption provides one piece of the complex puzzle offering a global annual indicator by commodity and country. It is relatively cheap but it does not necessarily answer the questions that nutritionists are interested in. This includes the ability to directly measure food consumed and be able to slice and dice the data by income, age, sex, etc. This type of information can only be gleaned from household surveys. These types of probability surveys tend to provide a wealth of data but they are very expensive (in terms of actual cost and response burden) such that even in countries with advanced statistical programs, they are only conducted occasionally. They too have their own challenges, one of which is to represent the entire population, including institutions. That being said, where household surveys exist they may provide valuable check data or even assist in filling data gaps.

Time

Time is an issue with the FAO balance sheet statistics as the data, at the time of writing, were only available up to 2003. The objective is to release 2004 and 2005 soon although the actual release date is yet to be determined. It is true that the FAO has recently experienced some unusual problems that have set back the release of these statistics. In part, this is due to the detailed and complex calculation that demands considerable time when problems arise.

Many statistical organisations struggle to balance timeliness and quality. Even so, they are often able to provide annual data within the year following the completion of the latest reference year. Usually they adhere to strict schedules and publish the release dates of all data sets so that users know what to expect, can plan for it and are treated fairly in that all users would have access to the same data at the same time.

Further, as revisions are sometimes necessary to fine-tune the data, there is also a revision schedule which outlines how far back the books are open until. Due to the high cost of revisions that stretch back in time, normal revisions can be limited to a specific number of years and the books only opened back a long way on occasion.

The time quandary BACK

Some countries publish their crop statistics on a seasonal or crop-year basis. This allows production to fall at the beginning of the crop year followed by the marketing of a large portion of that crop throughout the year. Ending and beginning stocks are then measured at a relatively low point in the year.

This makes some sense on a country basis but the crop years vary for different crops and in different climatic areas. And, sometimes there are multiple crops in some countries.

For the FAO, there is no obvious crop-year that would be better for most countries so the calendar has been chosen for simplicity. This is not a real limitation if countries have reasonable numbers related to December 31 stocks. This is particularly important for grain stocks as the December 31 on-farm inventories could vary tremendously depending on the recent harvest.

That being said, if a countries harvest is late in the calendar year, the flows will not be related to that year's production. One of the largest impacts on flows is production as it basically will determine if there is a shortage or surplus related to the following period.

If the FAO works with stock levels and a particular country produces estimates of December 31 inventories, then working with calendar year data is not a major limitation. Even in cases where a country does not publish year-end stocks, they could use a simple supply-disposition that started with inventories at the beginning of the crop-year, accounted for flows in and out of the sector and residually calculate the stocks at December 31. This is not the preferred method but it might be a useful tool at times.

Resources

The Statistics Division of the FAO has had its budget restricted in recent years and there is some concern that the budgets may be tightened in the future. In addition, there are internal competing demands for the limited statistical resources. According to anecdotal information, the funds dedicated to agricultural statistics in many countries have always been in short supply thus making the FAO's job even more challenging.

The task of producing a vast number of food balance sheets should not be underestimated. To do the job properly, allowing time to obtain and input data, analyse it (including related information), obtain check data, make decisions related to what should be published, ensure FAO data are consistent with a particular countries published data if it is conceptually similar and review it internally takes time for one commodity. For every country, estimates are required for multiple commodities. Currently, each of the asssigned employees completes the food balances for one country in one to two weeks. This is only enough time to allow for data input and balancing. It does not allow time for analysis. To further complicate the matter, not all staff producing the data have training along the lines of agricultural statisticians.

The computer systems used by the Statistics Division seem reasonably efficient. Although major efficiency gains from automation are unlikely, improvements are always a possiblility.

It is the old story of needing to do more with less but certainly there is tremendous pressure to produce the statistics in a very efficient manner.

POSSIBILITIES – LET THE FUNDAMENTALS DRIVE THE PROGRAM BACK

In reviewing a statistical program as large and complex as the balance sheets produced by the Statistics Division of the FAO, it is important to let the current fundamentals drive the program or any changes to the program. As a reminder, there are three sets of basic fundamentals including:

- FAO -data are central to the role of the organisation and public
- Theory -stock and flow accounts that balances and are linked over time
- Credible statistics -relevant, reliable and timely

The objective of the following recommendations is to build on the strengths of the current program and the FAO while overcoming any weaknesses. The objective is also to limit the threats and take advantage of any opportunities.

1. *It is recommended that the agriculture and food balance sheet statistics program including the public data set be continued, enhanced and properly resourced.*

The data associated with the agriculture and food balance sheets are a challenge to produce but they are tremendously valuable to both the FAO and a multitude of outside users. These data are directly relevant to the primary mandate of the FAO -reducing hunger around the world. What better justification is needed? There is no other data set available that even resembles the balance sheets. There is no substitute. Outside users, many of whom the FAO works with in varying ways, find the data valuable and would be left with a void that they could not fill in any other way were it not for the FAO statistics. Decision makers would be left with less information or guesses on which to base crucial decisions.

It is not unheard of in some organisations to cut programs as resources tighten. Sometimes, the programs are not cut directly but the resources are reduced to the point that it makes the undertaking too difficult to accomplish. But, the balance sheet statistics are a worthy data set that justifies being properly resourced.

To be clear, this recommendation has several implications. Numerous aspects of the existing program have been reviewed and found to have merit. They represent strengths inherent in the program and, therefore, should be incorporated into any future program. Consequently, following are several recommendations related to recommendation one.

i. *It is recommended that the agriculture and food statistics program continue to be annual.*

Maintaining the data on an annual basis is justified by the fact that agricultural production is dependent on the seasons and can vary significantly from one year to another.

ii. *It is recommended that the agriculture and food statistics program continue to be focused on the country level for all countries.*

There is tremendous demand for country level data by most users, including representatives of the individual countries. Regional data, where countries have been amalgamated are less valuable, although it may be necessary to incorporate certain countries into regional totals

when a particular country's data are unreliable. Besides, if country level data exists and regional data are required, it is simply a matter of adding up the data to the appropriate region.

Further, even though the FAO has a special interest in undernourished countries, all countries remain important. The global perspective remains relevant to the FAO. Even if a country is not undernourished, it may be an exporter and therefore relevant for a larger perspective.

iii. *It is recommended that the balance sheet program include agriculture and food commodities.*

It could be argued that the core program links directly to food balance sheets because of the concept of identifying areas of under nourishment that require attention. Even so, the distinction between an agriculture commodity (primary or farm level; wheat versus flour or cattle versus meat) and a food commodity is not always clear. Some commodities have a foot in both camps. All food through is produced through agriculture and consequently an understanding of agriculture supply and demand is often crucial to understanding food supply and demand. It is important for many users to have a complete picture.

iv. *It is recommended that the FAO continue to produce and release trade statistics at a level of detail and that is greater than what is required for the balance sheets and in a more timely manner than the balance sheets.*

Trade data can stand alone. Many users have an interest in trade and may not be interested in the balance sheet statistics. The data are independently valuable simply because of the wide use that is made of them resulting in the FAO providing a public good data set. This does not mean that the program should not be reviewed from the perspective of use, detail and resources. It simply means that any review should keep in mind the great value that trade statistics have, even when they are not associated directly with the balance sheets.

There is an opportunity for the Statistics Division to release trade statistics in a very timely manner as the trade data would normally be ready for release well before the balance sheets are completed. An early release of trade data would help improve the overall timeliness of the statistics program. All statistical organisations deliver various data sets with variable timeliness. It would even be possible to have an early release of preliminary data that is updated at a later point in time.

v. *It is recommended that supplementary data continue to be associated with the balance sheets.*

There is additional information associated with the balance sheets that is not directly required to calculated food available. The best example is area and yield. It is production that is required. Other examples might include the data released related to production that includes more commodities than those released as balance sheets on FAOSTAT. The additional data often add value to the balance sheets helping analysts develop an in-depth understanding that would be difficult to achieve otherwise.

FAO staff has suggested that the trade component of the balance sheets display both commercial trade and food aid trade. As the data exist, this is a low cost proposal that would be fundamentally relevant to the core business of the FAO.

2. *It is recommended that the balance sheet statistical program focus on the published data -the only balance sheets maintained would be those published.*

The impact of incorporating this recommendation would be that the myriad of balance sheets that are maintained at the processed product level and not published would no longer be required. The benefits of this change would be dramatic. First, considerable resources could be freed up that would be available for validation, including working closely with the various countries to help them provide data or verify the data provided. Second, the number of imputations would be greatly reduced, placing the information on a more sound statistical foundation. Third, with the volume of data that staff need to deal with reduced, the timeliness could be improved. Fourth, the reliance on outdated ratios would be greatly reduced.

It should be pointed out that the fundamentals of this method are not without precedent as it is essentially the technique used in other organisations or countries such as the European Union (Eurostat), United States or Canada to produce food available for consumption.

The recommendation may require that new factors pertaining to the published data, such as nutrient equivalent factors would need to be developed. Ideally, nutritionists would produce the data at the appropriate level, but if this was not immediately available, the numbers could be calculated using the current dataset.

If the calories are divided by the food available, the result is the factor of calories for a given unit of a particular food type (caution with the units). This factor or an average of several years of this factor could be applied to another year to estimate the calories available. The same technique could be applied to any nutrient or food until such time as nutritionists were able to develop a figure that was more appropriate. The figure implies a weighted average at the level that a particular food type is being estimated.

Other supporting data used to estimate specific data points or validate the data would still be required but the balance sheet information for items not published would not be needed.

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3. *It is recommended that the commodities covered by the program are reviewed primarily with a view ensuring that those that remain are relevant.*

The benefits of this suggestion parallel the first recommendation to a lesser extent. This includes saving resources, increased time for validation of published data, improved timeliness and reduced reliance on ratios.

Although, overall the expectation that incorporating this recommendation would result in reducing the number of commodities covered, there may be cases where relevant commodities are not covered but should be. An example of this is wheat flour, which is currently not included in the public program.

One technique to identify relevant commodities is to gather a small group together for a few hours to prioritise, in a simple way, the commodities covered. The group would consist of staff who manage the food statistics program at the FAO and any users in other areas that have an interest. The group would simply take each commodity and identify its priority as one, two, three or not relevant. Some commodities might be amalgamated. The group may be provided with a little analysis that displayed each commodity's contribution to the total.

Suggestions for new commodities would also be given a priority. The group would make a recommendation to management in relation to commodities to be included in a future program.

Then, management could review the lists and, given resources and strategy decide on which priorities would be part of the future estimates. Certainly, all priority one items would be included and none of the irrelevant ones would be maintained. But, decisions would be needed in relation to the other two categories.

Once the scope of the published program has been determined, then FAOSTAT can be reviewed with one eye on the defined program and the other on the array of unique users. *Please see Recommendation 7.*

Those recommending or making adjustments to the published data set should keep in mind that great caution should be exercised when cutting any public data sets in case there are situations where there are important but unknown uses of the data. Plans to cut data might best include a user consultation component advising users of potential change and providing time for feedback that could influence a final decision.

4. *It is recommended that agriculture and food stocks be obtained and displayed directly, implying discontinuing the estimation and display of the stock change.*

The main advantage of this recommendation is that it makes the data more transparent. It is a more honest way to portray the data and will provide the users with a layout that is easier to understand and corresponds more closely with the theory behind balance sheets and the practice in other organisations.

Stocks data can be difficult to obtain although certainly some countries have this data for some commodities or it can be derived. In fact, either the country or the World Agriculture Outlook Board or even Eurostat would have estimates of inventories in supplying countries of important agriculture items. In other words, where the stocks are relevant, they can probably be obtained.

The truth is that over time, stocks are not an item that should make an important contribution to food available for consumption because there are limits to how much a country should stockpile any food and it cannot be negative. And, it is only the change in stocks that will contribute to the food available numbers.

If a stock for a particular country does not exist, then the FAO does not necessarily need to estimate it, the balance sheet can be run without the stocks, displaying the data that does exist. If the resulting food available for consumption does not make sense during validation, then this is the number that needs to be worked with. Given that over time, stocks should have a limited impact on the final number, an average or perhaps a moving average of the previous 3 or 5 years might be appropriate. Or, a weighted average that puts a heavier weight on the more current year might be appropriate.

Production, exports and imports are good indicators themselves of the food available for consumption and analysts need to be cautious lest they smooth out real and relevant changes. The validation of the final results would require the input of an experienced agricultural

statistician. In the end, the final results might be best reviewed by a small team of professional staff, even if there are only two analysts. Staff working with the balance sheets will find check data, such as that available from the World Agriculture Outlook Board, valuable.

If stocks are actually displayed, it may be necessary to have a separate item called balancing factor or statistical discrepancy. The objective might be to minimize this item but if there is statistical error that cannot be reasonably distributed to other variables, then it would be preferable to have a balancing factor. The FAO could then decide to publish this factor as an indicator to users of statistical discrepancy or simply not display it and explain to users that it exists. Of course, sophisticated users would be able to calculate it.

5. It is recommended that imputations be limited and data gaps accepted. BACK

As discussed in the recommendation related to stocks, data should only be imputed when there is some sound statistical basis for that imputation. The basis for an imputation can be recent history, a relationship to another variable, and input from other organisations or field staff depending on the variable. (Currently, there is a report being developed that deals directly with imputation methods.) However, if there is no real basis for the imputation, then it should not be imputed (certainly not released) and would thereby be recognised as a data gap. Future efforts could be made to fill the gaps.

It is recognised that users need data and that data gaps can be a problem to deal with. On the other hand, all data releases should be supported by sound statistical methods (reliable data is one of the fundamental drivers of a statistical program). *Under Issues, please see, 'Large Number of Imputations'.*

To say it again in a slightly different way, if the resulting food available for consumption does not make sense during validation as a result of data gaps, then this is the issue that needs to be addressed.

6. It is recommended that the timeliness of the balance sheet statistics be advanced so that the data are released in the year following a reference year. Furthermore, the release dates and revision schedules should be made public.

Although the current situation is unusual, it is 2009 and the most current data available are for 2003. Users are hunger for timely data. The more current the data, the more relevant.

As previous recommendations should free up resources, this recommendation is possible.

Most statistical organisations inform users in advance of what will be released and when. This means that the statistical organisation is forced to work with strict schedules that must be adhered to in order to meet the release dates. This approach helps the organisation be more transparent and treats users in a fair way in that all users would have access to the data at the same time.

Further, as statistical organisations do not open their books up completely every time they release, users should be informed about the data that are subject to revision.

BACK

7. *If the recommendation to display stocks is accepted, then it is recommended that the published data are displayed in a simple fashion that is consistent with theory.*

Despite the fact that there are numerous variations on a theme, the data should be displayed such that the stocks and flows are obvious if not intuitive. Users could work through the math. The display could be vertical or horizontal and might look something like the following. Or, it could look similar to the balance sheet that is provided under SUA/BS, Food Balance Sheets on FAOSTAT. In this case, the ability to display the data as a time series would be important. *Please see annexes 1 to 6 for examples of published data from the FAO, Canada and the United States.*

The current FAOSTAT, in an attempt to provide a good service to users, offers the same data in different categories, providing the user with options on access to the data. However, this can be confusing, internally inconsistent, redundant and is not necessary, despite the fact that it is easy to do.

A simple and transparent display is particularly important for the FAO. This is because most users are not agricultural statisticians and they may be working in a second language.

Table 3: Conceptual presentation of a Balance Sheet

Balance sheet for a specific commodity in a specific country	
Supplies	tonnes
Beginning stocks	Stocks at January 1
Production Imports	
Total Supplies	Sum of beginning stocks, production and imports
Disposition	tonnes
Exports	
Feed Seed Manufacturing Waste	These disposition items will not be relevant for all commodities
Ending Stocks	Stocks at December 31
Balancing factor (if needed)	
Net Supply	Residually calculated -equals total food available for consumption note that total dispostion could be displayed but equals total supplies
Available per person	
Kilograms/year Grams/day	
Calories/day Protein in grams/day Fat in grams/day	

8. It is recommended that the naming conventions be clarified. BACK

Although there are synonyms, the FAO Statistics Division should adopt terminology to refer to the balance sheets in a manner that is consistent internally and, if possible, with other statistical organisations. In the spirit of keeping the work as simple as possible, limiting the synonyms would be useful.

As is the case in the European Union, United States and Canada, the term consumption should be replaced with the term available. It really is food available for consumption and it is misleading to use the word consumption. Further, it will frustrate all those nutritionists out there who must work with the data.

And to be up front, if the FAO has an item that is truly a balancing factor or a combination of a change in stocks and balancing factor, then it should be described for what it is with a footnote to explain it if need be.

A small point –the term per capita is not used every day by most people and the FAO statistics are used around the world by people working in second languages. Why not simply refer to per capita as per person as that is all it is?

9. It is recommended that the FAO continue to provide quality indicators and enhance the metadata provided to users.

When users access the FAO balance sheets, they can obtain codes that tell them if the number is an official data point, an FAO estimate or missing. This is useful to assess quality. Further, on the Statistics Division home page there are documents that help explain the data. When obtaining data, there is a metadata button but it is not obvious how this works, although the idea is sound. Making metadata available is important for users in order to help them assess the data and its appropriateness for their use. The metadata should be easily accessible to users and a complete concepts and methods write-up should be available on the site. There is a handbook on food balance sheets that could be updated and made available electronically.

10. It is recommended that the Statistics Division use data directly from other credible organisations whenever it is possible to reach an agreement. It is further recommended that the staff working with the FAO balance sheets either maintain (if they already exist) or enhance working relationships internally, with other countries and other organisations.

Internally, there is a wealth of knowledge and, in some cases, input data. As the Statistics Division is a service organisation, offering a good service to its users is very important. These users can also provide friendly and invaluable advice if not actual input.

The 'Outlook' group already prepares and publishes an array of agricultural and food supply-demand tables using virtually the same methods that are being proposed, except that they are on a marketing year basis. Perhaps, the Statistics Division could simply use the relevant historical data from this group. This would save resources and avoid duplication that is inefficient and confusing to users.

Surely, if countries such as the European Union, U.S. or Canada have well developed food statistics programs, then the data produced by the FAO should be consistent with the outputs of those programs, if not identical. It is possible simply to use the data directly, again saving resources.

Many of the internal users could provide valuable input helping to guide the program. For instance, their perspective is important when determining the commodities covered. These groups may even be willing to assist despite certain costs as they have a vested interest in the statistical program. As an example, the FAO nutrition staff have a keen interest in the outputs and may be willing to provide advice on certain inputs, such as the nutrient factors.

Although it is not always easy because of language issues and differing levels of statistical programs in different countries, it is important that analysts working with a particular country have working relationships with the appropriate staff in those countries. These could be win-win relationships. The FAO analysts would be better able to obtain or clarify data and the country representatives would develop a better understanding of the statistical needs related to agriculture and food. They might also learn how to better provide that data. It is conceivable that analysts with the FAO would visit particular countries to assist or teach others how to complete the various questionnaires.

Other organisations can provide the FAO with data that are useful in validation and a deeper understanding of agriculture or food supply and demand reality. Professional staff responsible for the food balance sheets would gain from visiting organisations such as Eurostat, the World Agricultural Outlook Board, the National Agriculture Statistics Service, the Economic Research Service (all under the USDA), or even Statistics Canada.

There are other possibilities including staff exchanges or inviting staff from other organisations to visit the FAO and explain their food statistics programs or even review proposals, such as these, related to the FAO program.

BACK

11. It is recommended that any adjustments to the balance sheets respect the basic theory.

There are a few fundamentals that all balance sheets should respect. Of course, they should balance, which means that the total supplies must equal the total disposition. The ending stocks of one period equal the beginning stocks of another. The flows to food processing are accounted for from the primary to the processed product to account for all food once and only once.

Also, the food available for consumption is normally calculated residually at the level of the individual balance sheet. It is not a sum of the components of related balance sheets.

12. It is recommended that all revisions, including those that might result from adopting these recommendations, need to be incorporated in a way that users view as appropriate.

Apparently, when the FAO releases data, it will often revise data back to 1960. This can cause some grief for users who generally detest revisions. Other options might include a break in the

data or smoothing the data in over the period of several years (say 5). There are different methods to accomplish this although straight-line smoothing is very simple.

If newly produced data are similar then there is no need to smooth the data over time. If there is a need to smooth the data then the method should be consistent amongst the various commodities that require smoothing.

13. *It is recommended that when the food statistics balance sheet program stabilizes that the FAO consider including nutrients on a waste-adjusted basis.*

Although other countries do waste adjust the nutrients available for consumption, primarily to account for waste between the retail level and fork-level, the first time that the waste-adjustment factors are established, will be a substantial task. Different waste factors will be required for each commodity and perhaps by country. Even so, including waste-adjusted nutrients would better reflect the true consumption making it easier for users to work with the data and limiting the assumptions that may or may not be made when working with the current data set. Countries that produce waste (or loss) adjusted nutrients available provide both sets of data and let the user decide on what is most appropriate. This is because the waste adjusted nutrients are less reliable but a closer approximation of consumption.

14. *It is recommended that when the food statistics balance sheet program stabilizes that the FAO consider expanding the nutrients to include vitamins, minerals and fibre.*

Essentially, the other nutrients can be derived in the same was as the current nutrients (calories, protein and fat) are derived. That is by multiplying the food available for consumption by a nutrient equivalent factor. This is an easy task once the factors are established and it would expand the number of data points tremendously. Nutritionists would find this information very valuable.

Considering the basic goals of the FAO, There is no need for the FAO to be at the leading edge of statistical development and practice. The organisation would be better served by adopting established statistical practices that have been proven by other institutions.

It should be noted that the recommendations contained in this report are consistent with well established food statistics programs in other countries including the European Union, the United States and Canada. Were the basic recommendations accepted, The FAO would be adjusting the food statistics program to align more closely with those that have been tried and tested, albeit at the country level. This lends support to the methods and helps ensure that the program is robust and defendable. Were the FAO to adopt the recommendations in this report related to agriculture and food balance sheets, then the final outcome would be a world-class statistical program.

Further, it is not necessary to carry any recommended changes back to the beginning of time. Any new method could be incorporated as of a specific year and smoothed back over a limited number of years if need be. The important aspect of the recommendations is to position the FAO statistical program for the future.

THE FINAL RESULT

BACK

If these recommendations are incorporated, how will the FAO agriculture and food balance sheets appear? To the user, the data set would be familiar. The balance sheets would be available by commodity and country over time and display several variables including the level of stocks. The data would be available on a timely basis, something that users might not expect. The program would remain impressive due to its scope.

The layout would be such that the user could calculate total supplies or disposition along with the food available for consumption if need be. The program would be more transparent and defendable. Reducing the risk of change to the FAO, it would conform to practices in countries that have well developed food statistics programs.

Internally, the number of balance sheets maintained would mirror the published data, a dataset containing only relevant commodities. Staff would be available to focus more on the validation of the data, regularly interacting with data suppliers in other countries and ultimately improving the data quality.

At the working level, the FAO would have a set of balance sheets for the commodities published. Essentially, the basic framework would be by country, calendar year and commodity that utilised actual stocks. For each year, the data would be input. If there was no input data, some gaps could be filled using historical or related data to produce estimates. If there was no basis for the estimates and therefore no confidence that the estimates were reasonable, the gaps would be left empty and recognised as data gaps. In the end, the food available for consumption would be residually derived and analysed. If it was possible and reasonable, given some analysis, then it would be accepted. If it was deemed unreasonable, then it would be broken out of the balance sheet and estimated independently, largely based on past trends while paying attention to the current situation. In some cases 3 or 5 year moving averages would be appropriate.

To achieve this goal will probably require resources and effort on the part of existing staff. A project team would be appropriate. The chance of success increases if members of the team are dedicated to the project and the staff are experienced. Although the core staff may need to work on the project full-time, other staff could be assigned to the team on a part-time basis, lending their skills and time at crucial points.

Despite some of the significant changes suggested, the impact on the actual numbers being released would be limited. There is not likely to be a shock to users because of coverage, presentation or substantial revisions. The changes would imply more variability in the data that has been balanced to maintain its consistency for a long period of time.

The end result would be a food balance sheet program driven by fundamentals that remains relevant to the core business of the FAO; is consistent with the supporting theory; and, reflects good statistical practices. The food statistics data set would be as reliable as possible given the limitations of the statistical programs in countries around the world. It would also be timely. The outcome, consistent with similar programs in other organisations, would be a respected program that staff and the FAO could stand behind. Users would have confidence in the FAO balance sheet statistics and tend to focus on the true purpose of the data –to make better, informed decisions.

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Annex 1: Sample of published data from FAO (FAOSTAT Food Balance Sheets)

BACK

Annex 6 FAOSTAT Published food balance sheets

Note: Reformated in Excel for presentation purposes

item	Production (1000	Import Quantity	Stock Variati	Export Quantity	Domestic supp	Feed (1000	Seed (1000 t	Waste (1000 t	Processing (1	Food (1000 to	Other Util ('	Food co	Food consu	Protein c	Fat consu
Grand Total +	2003			World									2,808.9	75.7	79.6
Vegetal Products +													2,331.7	46.6	44.2
Animal Products +													477.2	29.1	35.4
Cereals - Excluding Beer +	1,886,062	296,240	26,604	297,128	1,911,778	681,448	67,898	80,060	104,265	948,876	31,242	151	1,302.8	31.6	5.5
Wheat	559,973	132,470	17,663	134,164	575,942	91,555	33,012	19,268	5,029	420,845	8,249	67	518.0	15.3	2.2
Rice (Milled Equivalent)	389,137	26,756	- 4,547	28,807	382,539	7,055	11,370	19,061	3,194	340,506	1,367	54	541.9	10.1	1.3
Barley	141,335	24,832	4,211	30,489	139,888	95,205	9,578	4,346	23,318	7,087	342	1	8.0	0.2	0.0
Maize	640,871	92,876	8,223	90,489	651,480	414,204	5,857	28,334	69,754	116,419	16,930	19	152.7	3.7	1.2
Rye	14,662	2,283	2,634	2,176	17,403	8,109	1,852	581	380	6,173	310	1	7.4	0.2	0.0
Oats	26,415	3,084	97	2,996	26,600	19,360	3,362	560	-	3,274	34	1	2.9	0.1	0.1
Millet	33,248	255	- 347	251	32,905	3,205	745	3,152	363	25,440	-	4	33.3	0.9	0.4
Sorghum	59,621	6,555	- 1,326	6,339	58,512	26,594	970	4,100	2,303	24,515	31	4	32.7	1.0	0.3
Cereals, Other	20,800	7,128	- 3	1,417	26,509	16,161	1,154	658	- 76	4,617	3,979	1	5.7	0.2	0.0
Starchy Roots +	692,444	45,255	4,813	39,053	703,459	147,232	37,749	68,078	13,693	405,290	31,541	65	145.8	2.2	0.3
Cassava	190,185	22,208	- 66	18,494	193,833	50,931	0	25,695	1,293	103,400	12,625	16	43.6	0.3	0.1
Potatoes	315,287	22,517	4,879	20,125	322,557	39,421	36,086	21,890	12,306	206,520	6,334	33	60.9	1.5	0.1
Sweet Potatoes	129,533	136	0	102	129,566	55,802	102	7,738	93	65,789	43	10	28.1	0.3	0.1
Yams	39,553	39	-	34	39,558	503	1,356	9,631	-	17,633	10,434	3	7.7	0.1	0.0
Roots, Other	17,886	356	0	297	17,945	575	204	3,124	1	11,948	2,105	2	5.5	0.1	0.0
Sugarcrops +	1,579,831	475	- 1,251	375	1,578,679	19,898	29,010	10,894	1,486,967	25,522	6,400	4	3.2	0.0	0.0
Sugar Cane	1,349,476	77	870	70	1,350,353	16,928	29,010	10,335	1,264,072	25,503	4,515	4	3.2	0.0	0.0
Sugar Beet	230,355	398	- 2,121	305	228,327	2,970	-	559	222,895	19	1,885	-	0.0	-	-
Sugar & Sweeteners +	184,027	49,407	- 7,670	52,273	173,490	608	-	236	2,177	160,037	10,825	25	244.0	0.1	0.0
Sugar, Non-Centrifugal	11,050	0	-	0	11,051	435	-	30	78	9,998	510	2	15.4	0.0	-
Sugar (Raw Equivalent)	149,752	41,966	- 7,689	45,917	138,113	140	-	206	1,291	130,988	5,523	21	203.6	-	-
Sweeteners, Other	21,907	7,041	26	5,953	23,021	33	-	0	795	17,760	4,792	3	23.4	0.0	-
Honey	1,317	399	- 7	403	1,306	0	-	-	13	1,293	0	0	1.7	-	-
Pulses +	58,033	8,812	- 710	9,184	56,951	11,547	3,853	2,742	137	38,329	365	6	57.1	3.6	0.3
Beans	19,925	2,839	- 11	3,473	19,280	1,532	1,148	961	17	15,612	10	2	23.1	1.5	0.1
Peas	10,121	2,500	- 469	2,205	9,948	4,668	881	332	-	4,046	20	1	5.9	0.4	0.0
Pulses, Other	27,987	3,472	- 231	3,506	27,723	5,347	1,825	1,449	120	18,670	334	3	28.1	1.8	0.2
Treenuts	9,180	4,648	- 169	4,014	9,645	-	0	300	0	9,211	166	1	10.0	0.3	0.8
Oilcrops +	404,590	85,005	2,785	85,284	407,096	22,993	10,451	11,657	310,327	46,553	6,054	7	57.3	2.8	4.1
Soyabeans	188,935	65,914	2,791	65,312	192,328	7,947	6,299	4,505	162,525	10,829	224	2	16.4	1.5	0.6
Groundnuts (Shelled Eq)	25,394	1,710	- 598	1,749	24,756	28	1,319	1,104	13,054	9,095	265	1	21.1	0.9	1.8
Sunflowerseed	27,726	3,231	- 237	3,726	26,994	2,449	518	585	22,938	443	63	0	0.6	0.0	0.1
Rape and Mustardseed	37,311	7,047	661	7,563	37,456	4,209	481	1,062	30,911	842	158	0	1.7	0.1	0.1
Cottonseed	34,330	978	360	986	34,681	7,073	1,401	700	24,255	-	1,251	-	-	-	-
Coconuts - Incl Copra	53,550	1,831	- 378	2,133	52,870	43	141	2,500	25,101	21,615	3,476	3	12.5	0.1	1.1
Sesameseed	3,213	800	36	737	3,312	0	62	104	1,972	1,162	15	0	2.9	0.1	0.3
Palmkernels	7,595	85	171	79	7,771	0	-	9	7,682	6	78	-	0.0	-	-
Olives	17,433	630	67	622	17,508	-	-	701	14,788	1,929	90	0	1.2	0.0	0.1
Oilcrops, Other	9,102	2,780	- 89	2,375	9,418	1,244	230	388	7,102	632	434	0	0.9	0.1	0.1

Annex 2: Example of published balance sheets – Canada

BACK

Canada Food Stats 2009

Supply and Disposition of CEREALS - Canada											Available per person, per year		
Commodity	Year	Beginning Stocks	Production	Imports	Total Supply	Exports	Manufacturing	Waste	Ending Stocks	Net Supply	Retail Weight	Fresh Equivalent	Adjusted for losses *
						('000 tonnes)						(kg)	
Wheat Flour	1994	28.75	1977.51	34.63	2040.89	219.67	71.66	34.40	29.77	1685.40	58.12	...	40.91
	1995	29.77	1990.46	22.47	2042.70	206.64	72.62	34.86	20.65	1707.94	58.29	...	41.03
	1996	20.65	2002.58	22.10	2045.33	153.80	74.70	35.86	23.95	1757.02	59.34	...	41.77
	1997	23.95	2111.19	19.69	2154.83	130.69	79.67	38.24	32.44	1873.79	62.66	...	44.11
	1998	32.44	2164.96	21.15	2218.55	152.47	81.43	39.09	30.37	1915.20	63.51	...	44.71
	1999	30.37	2237.86	34.58	2302.81	160.94	84.66	40.64	25.36	1991.21	65.50	...	46.11
	2000	25.36	2318.38	36.70	2380.44	168.63	87.48	41.99	24.89	2057.45	67.05	...	47.20
	2001	24.89	2388.00	28.63	2441.52	179.01	88.69	42.57	45.24	2086.00	67.25	...	47.34
	2002	45.24	2444.61	20.96	2510.81	221.68	90.56	43.47	25.24	2129.87	67.93	...	47.82
	2003	25.24	2398.99	28.71	2452.94	204.14	89.03	42.73	23.08	2093.96	66.18	...	46.59
	2004	23.08	2429.06	42.89	2495.02	219.53	90.16	43.28	21.48	2120.58	66.39	...	46.74
	2005	21.48	2445.51	49.04	2516.03	205.52	91.59	43.96	20.69	2154.26	66.81	...	47.03
	2006	20.69	2444.08	52.37	2517.14	223.43	90.81	43.59	23.50	2135.81	65.56	...	46.16
	2007	23.50	2390.13	100.50	2514.13	201.35	91.39	43.87	27.92	2149.59	65.28	...	45.96
	2008	27.92	2247.99	112.56	2388.47	168.52	87.91	42.20	22.26	2067.58	62.07	...	43.70
Rye Flour	1994	x	x	0.21	x	0.13	...	0.21	x	9.92	0.34	...	0.24
	1995	x	x	0.22	x	0.15	...	0.22	x	10.59	0.36	...	0.25
	1996	x	x	0.20	x	0.09	...	0.18	x	8.72	0.29	...	0.21
	1997	x	x	0.23	x	0.07	...	0.22	x	10.64	0.36	...	0.25
	1998	x	x	0.26	x	0.03	...	0.21	x	10.31	0.34	...	0.24
	1999	x	x	0.16	x	0.09	...	0.20	x	9.62	0.32	...	0.22
	2000	x	x	0.13	x	0.10	...	0.19	x	9.14	0.30	...	0.21
	2001	x	x	0.16	x	0.06	...	0.20	x	9.98	0.32	...	0.23
	2002	x	x	0.13	x	0.28	...	0.20	x	9.45	0.30	...	0.21
	2003	x	x	0.09	x	0.17	...	0.21	x	9.93	0.31	...	0.22
	2004	x	x	0.08	x	0.10	...	0.21	x	10.20	0.32	...	0.22
	2005	x	x	0.08	x	0.80	...	0.20	x	8.77	0.27	...	0.19
	2006	x	x	0.23	x	1.70	...	0.21	x	8.57	0.26	...	0.19
	2007	x	x	0.32	x	2.11	...	0.23	x	8.94	0.27	...	0.19
	2008	x	x	0.83	x	1.80	...	0.22	x	9.12	0.27	...	0.19

Annex 3: Example of display of Nutrients Available – Canada

Canada Food Stats

Nutrients available from the Canadian food supply, per person, per day

ENERGY (kcal)	2004	2005	2006	2007	2008
TOTAL	3490.02	3448.58	3404.32	3389.40	3371.63
Cereal Products, total	*835.52*	*835.28*	*825.62*	*820.78*	*814.56*
Breakfast food	57.49	59.61	59.44	60.66	61.07
Corn flour and meal	14.68	10.69	13.74	7.39	10.33
Oatmeal and rolled oats	29.85	29.06	25.83	28.42	24.71
Pot and pearl barley	0.78	0.79	0.89	0.87	0.93
Rice	71.89	70.63	73.65	74.06	99.97
Rye flour	3.10	2.64	2.55	2.63	2.66
Wheat flour	657.73	661.86	649.53	646.74	614.90

Annex 4 – Sample balance sheet – U.S. Wheat Supply and Disappearance

All wheat: Supply and disappearance[1] **FILENAME: GRAINS**

Marketing year[2]	U.S. population, January 1 of following year[3]	Supply				Use					
		Production	Imports[4]	Beginning stocks[5]	Total supply[6]	Exports[4]	Seed use	Feed and residual use[7]	Ending stocks[5]	Food disappearance[6] Total	Food disappearance[6] Per capita[8] *K/B*60*
	Millions	Million bushels									Pounds
1996	271.36	2,277.4	92.3	376.0	2,745.7	1,001.5	102.3	307.6	443.6	890.7	196.9
1997	274.626	2,481.5	94.9	443.6	3,020.0	1,040.4	92.5	250.5	722.5	914.1	199.7 -
1998	277.79	2,547.3	103.0	722.5	3,372.8	1,045.7	80.5	390.7	945.9	910.0	196.6 -
1999	280.976	2,295.6	94.5	945.9	3,336.0	1,086.5	91.7	279.3	949.7	928.8	198.3 *
2000	283.9	2,228.2	89.8	949.7	3,267.7	1,062.0	79.5	300.4	876.2	949.6	200.7 -
2001	286.728	1,947.5	107.6	876.2	2,931.2	962.3	83.4	182.0	777.1	926.4	193.9 -
2002	289.421	1,605.9	77.4	777.1	2,460.4	850.2	84.4	115.7	491.4	918.6	190.4 -
2003	292.057	2,344.8	63.0	491.4	2,899.2	1,158.3	79.7	202.9	546.4	911.9	187.3 -
2004	294.741	2,158.2	70.6	546.4	2,775.3	1,065.9	77.6	182.1	540.1	909.6	185.2 *
2005	297.435	2,104.7	81.7	540.1	2,726.5	1,009.3	77.7	151.3	571.2	917.0	185.0 -
2006	300.32	1,812.0	122.0	571.2	2,505.2	908.0	81.0	122.2	456.0	938.0	187.4 -
2007	303.204	2,067.0	113.0	456.0	2,636.0	124.0	88.0	1,170.0	306.0	948.0	187.6 -

Numbers in italics are linked.

- Beginning stocks equal previous year's ending stocks. * = Beginning stocks do not equal previous year's ending stocks.

[1]Grain equivalent. [2]Beginning June 1 of year indicated. [3]Resident plus the Armed Forces overseas. [4]Includes flour and other products expressed in wheat equivalent. [5]Includes stocks on farms, in terminal markets, interior mills, elevators, warehous

Source: USDA/Economic Research Service. Data last updated February 27, 2009.

Annex 5: Sample – Food Balance Sheet – U.S. Wheat flour

Wheat flour: Supply and disappearance

Calendar Year	U.S. population[1]	Supply			Disappearance			
		Flour production[2]	Flour, semolina, pasta, bulgur, couscous imports[3]	Total supply[4]	Flour exports	semolina, pasta bulgur, and couscous exports	Food availability[4] Total *^G-H-I*	Food availability[4] Per capita *J/B/10*
	Millions	1,000 hundredweight						Pounds
1996	269.714	397,776	8,575	406,351	10,651	881	394,818	146.4
1997	272.958	404,143	8,681	412,824	11,038	1,167	400,619	146.8
1998	276.154	398,914	9,745	408,659	12,413	1,353	394,893	143.0
1999	279.328	411,968	9,295	421,263	17,499	1,633	402,132	144.0
2000	282.433	421,270	9,666	430,936	16,005	1,693	413,239	146.3
2001	285.372	404,521	10,130	414,651	10,507	1,695	402,449	141.0
2002	288.215	394,700	11,291	405,991	9,226	2,683	394,082	136.7
2003	290.964	396,215	11,145	407,360	5,768	3,953	397,639	136.7
2004	293.644	393,925	10,726	404,651	5,152	4,662	394,837	134.5
2005	296.373	394,973	11,262	406,235	3,747	4,741	397,748	134.2
2006	299.199	403,391	11,740	415,131	3,412	5,867	405,852	135.6
2007	302.087	418,836	11,511	430,347	6,707	6,486	417,155	138.1

Numbers in italics are linked.

[1]MTED's resident plus the Armed Forces overseas population. [2]Commercial production of wheat flour, whole wheat, industrial, and durum flour and farina reported by the Bureau of Census. Production prior to 1970 includes estimate for noncommercial wheat

Source: USDA/Economic Research Service. Data last updated February 27, 2009.

Annex 6: Sample – U.S. Nutrient File (Partial -actual file contains more food groups, vitamins and minerals etc)

U.S. food supply: Nutrients contributed from major food groups, per capita per day, 1970 and 2004[1]

Food group	Food energy		Carbohydrates		Protein		Fat								Cholesterol	
							Total		Saturated		Monounsaturated		Polyunsaturated			
	Kilo-calories	% of total	Grams	% of total	Grams	% of total	Grams	% of total	Grams	% of total	Grams	% of total	Grams	% of total	Milli-grams	% of total
Meat, poultry, and fish																
1970	579.2	18.1	0.4	0.1	38.9	39.7	46.3	31.9	17.8	34.9	20.5	35.4	4.2	16.6	179.9	39.1
2004	522.6	13.4	0.5	0.1	45.5	40.3	36.3	20.3	12.6	22.5	17.1	21.7	4.8	13.0	191.8	44.6
Legumes, nuts, and soy																
1970	96.0	3.0	8.3	2.1	5.2	5.3	5.4	3.7	1.0	2.0	2.3	4.0	1.6	6.5	0.0	0.0
2004	120.9	3.1	9.1	1.9	6.9	6.1	7.3	4.1	1.3	2.4	3.3	4.2	2.3	6.1	0.0	0.0
Vegetables[4]																
1970	179.2	5.6	41.4	10.5	5.9	6.0	0.7	0.5	0.1	0.2	0.1	0.2	0.3	1.3	0.0	0.0
2004	183.3	4.7	41.8	8.7	6.2	5.5	0.9	0.5	0.1	0.2	0.1	0.1	0.4	1.0	0.0	0.0
White potatoes																
1970	89.6	2.8	20.9	5.3	2.4	2.4	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.0	0.0
2004	93.6	2.4	20.7	4.3	2.5	2.2	0.2	0.1	0.1	0.1	0.0	0.0	*	0.1	0.0	0.0
Dark green, deep yellow																
1970	12.8	0.4	3.2	0.8	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	*	0.1	0.0	0.0
2004	15.6	0.4	3.4	0.7	0.6	0.5	0.2	0.1	0.0	0.0	0.0	0.0	*	0.1	0.0	0.0
Other vegetables																
1970	76.8	2.4	17.7	4.5	3.1	3.2	0.6	0.4	0.1	0.1	0.1	0.1	0.3	1.0	0.0	0.0
2004	78.0	2.0	17.8	3.7	3.1	2.7	0.5	0.3	0.1	0.1	0.1	0.1	0.3	0.7	0.0	0.0
Grain products																
1970	630.4	19.7	133.6	33.9	17.8	18.2	2.0	1.4	0.4	0.7	0.3	0.5	0.8	3.3	0.0	0.0
2004	916.5	23.5	191.4	39.8	24.6	21.8	4.1	2.3	0.8	1.5	0.9	1.2	1.5	4.1	0.0	0.0
Sugars and sweeteners																
1970	588.8	18.4	154.1	39.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2004	674.7	17.3	179.4	37.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous[5]																
1970	25.6	0.8	5.1	1.3	1.7	1.7	1.2	0.8	0.5	0.9	0.4	0.7	0.2	0.7	0.0	0.0
2004	35.1	0.9	6.7	1.4	2.3	2.0	1.8	1.0	0.7	1.3	0.6	0.8	0.3	0.7	0.0	0.0

*Less than 0.05 but more than 0.

[1]Percentages for food groups are based on aggregate nutrient data from table 39. [2]Excludes butter. [3]Includes butter. [4]Totals may not add due to rounding. [5]Coffee, tea, spices, chocolate liquor equivalent of cocoa beans, and fortification not assigned to a particular group.

Source: USDA/Center for Nutrition Policy and Promotion, Feb. 27, 2009.