Food Balance Sheets (FBS)

Producing analytical data sets for monitoring and analysing food security and food policies
What is a Food Balance Sheet?

A Food Balance Sheet (FBS) is an aggregated and analytical data set that presents a comprehensive picture of the pattern of a country’s food supply and utilization during a specified reference period.

FBS are built on the premise that within a given country in a given year, the sum of all aspects of the supply of a given food product must be equal to the sum of utilizations of that product.

This balance is compiled for every food item (estimated on a primary-commodity-equivalent basis) consumed within a country. All primary-commodity-equivalent balances are then combined into a single overall FBS.

FBS provide estimates for every food item of per capita food available for human consumption in terms of quantity, calories, protein and fat.

**BASIC FBS EQUATION**

- **Food Supply**
  - Production
  - Imports
  - Stock variations
- **Food Utilization**
  - Exports
  - Food availability
  - Food processing
  - Food loss
  - Residual and other utilization

Viewing the domestic food supply and demand situation through FBS allows countries to examine conditions in a holistic way, aiding food supply analysis and facilitating food policy formulation.
### FBS components

For each food product of the FBS, **food supply must be equal to food utilization**

#### SCOPE OF DIFFERENT FBS COMPONENTS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRODUCTION</strong></td>
<td>All production quantities of a given commodity within the country, including both commercial and non-commercial production</td>
</tr>
<tr>
<td><strong>IMPORTS</strong></td>
<td>Transboundary flows of goods for a given final destination country that add to the total supply of goods available in that country</td>
</tr>
<tr>
<td><strong>STOCK VARIATIONS</strong></td>
<td>Difference between the aggregate total product allocated to storage for use at a future point in time (regardless of intended future utilization) and the stock withdrawals made during the period</td>
</tr>
<tr>
<td><strong>EXPORTS</strong></td>
<td>Transboundary flows of goods from a given country of origin that subtract from total availability of goods in that country</td>
</tr>
<tr>
<td><strong>FOOD AVAILABILITY</strong></td>
<td>Quantity of any substance, whether raw, processed or semi-processed (including beverages), available for human consumption during a given reference period</td>
</tr>
<tr>
<td><strong>FOOD PROCESSING</strong></td>
<td>The quantities of a food product that are directed towards a manufacturing process and are then transformed into a different edible commodity, with a separate entry in the FBS</td>
</tr>
<tr>
<td><strong>FEED</strong></td>
<td>All quantities of commodities, both domestically produced and imported, that are available for feeding to livestock and poultry</td>
</tr>
<tr>
<td><strong>SEED</strong></td>
<td>Any quantity of a commodity set aside for reproductive purposes in the following year</td>
</tr>
<tr>
<td><strong>TOURIST FOOD</strong></td>
<td>Food that is available for consumption by non-resident visitors to a given country during the course of their stay</td>
</tr>
<tr>
<td><strong>INDUSTRIAL USE</strong></td>
<td>Any quantity of a given product used in a non-food transformation or manufacturing process, including for biofuels, cosmetics, detergents, or paints</td>
</tr>
<tr>
<td><strong>LOSS</strong></td>
<td>The quantities of a product that leave the supply chain and are not diverted to other uses</td>
</tr>
<tr>
<td><strong>RESIDUAL AND OTHER UTILIZATION</strong></td>
<td>The combined imbalance and accumulated error in the supply-equals-utilization equation</td>
</tr>
</tbody>
</table>
The potential uses of FBS

FBS data can be used in numerous applications (including econometric studies, trend analyses, investigations of dietary content, and nutritional adequacy analyses).

**POLICY-MAKERS**
- Food policy analysis and food situation assessment

**FIRMS**
- Market analysis to seek new opportunities

**ACADEMICS**
- Input in econometric models

**1. MEASURING AND ANALYSING OVERALL FOOD SUPPLY**
- Estimation of country’s Dietary Energy Supply (DES)
- Estimation of country’s protein and fat availability

**2. FOOD SUPPLY ASSESSMENT: CALCULATION OF INDICATORS**
- Prevalence of Undernourishment (PoU)
- Self-Sufficiency Ratio (SSR)
- Import Dependency Ratio (IDR)

**3. BENCHMARKING AND MARKET ANALYSIS**
- Compare food availability from one country to another on both aggregate and product-specific levels

**4. COMPARING FOOD AVAILABILITY OVER TIME**
- Track changes in food supply over time, including estimated total caloric availability, growth of consumption of new products, and general changes in dietary composition
Within the Sustainable Development Goal (SDG) framework, FBS contribute to the calculation of the **Prevalence of Undernourishment (PoU)** under SDG 2 (No Hunger) and the **Global Food Loss Index** under SDG 12 (Responsible consumption and production).

**IMPROVING NATIONAL STATISTICAL INTEGRATION**
- FBS provide a framework for reconciling data, as total supply must equal total utilization.
- By bringing together all relevant stakeholders, problems or inconsistencies in data collection and estimation can be identified and a country’s overall agricultural statistical program can be improved.

**INPUT FOR NATIONAL ACCOUNTS**
- Fundamentally, FBS are an accounting framework specific to food and agricultural products; as such, FBS are naturally complementary to the estimation of national accounts.

**PROVIDING INPUT FOR ECONOMIC MODELS**
- FBS data can be used by several models that are structured using the supply-use format of national accounts data.
- Most partial equilibrium models for agriculture utilize commodity balances in their data structures.
Data sources for FBS compilation

FBS data come from different sources that are often specific to the FBS components (production, trade data, food processing, etc.).

In the improved methodology for FBS compilation, the Food and Agriculture Organization of the United Nations (FAO) has provided recommendations for the data sources of each component.

It is recommended to create a technical working group to better leverage the use of the various data sources and facilitate the validation of the final output.
Producing analytical data sets for monitoring and analysing food security and food policies

**International classification and FBS**

Within FBS, two classifications are used:

- The UN Central Product Classification (CPC) for production data
- The Harmonized Commodity Description and Coding System (HS) of the World Customs Organization (WCO)

The mapping between these two classifications facilitate the comparison of production and trade data within the FBS context.

**What if data are missing?**

If data are missing for a given component for a commodity, FBS compilers may perform **estimations and imputations**.

In the new methodology for FBS compilation, FAO has recommended methods to derive national-level FBS estimations for each component.
Steps for compiling FBS and estimating macronutrients

**COMPILEING FBS**

The most important step in compiling FBS is the establishment of Supply Utilization Accounts (SUA) for all edible commodities in a country. Once established, the SUA is standardized into their primary equivalent and aggregated into an overall FBS.

**SUPPLY UTILIZATION ACCOUNT (SUA)**

- Establish the basic FBS equation for each commodity in the SUA

**STANDARDIZE SUA**

- Convert components for each SUA commodity into their primary equivalent by using extraction rate

**AGGREGATE INTO FBS**

- Aggregate SUA commodity belonging to the same commodity tree and balance the equation to obtain the FBS
MACRONUTRIENT ESTIMATES

Population data and nutrient data are combined with the food component of each SUA commodity to derive the per capita daily supplies of energy, protein and fat of each food item.

When the lines for all commodities have been included, the per capita daily supplies of energy, protein and fat for the individual commodities can then be added together up to calculate total daily supplies.

FBS tools at country level

FAO, in partnership with the Global Strategy to improve Agricultural and Rural Statistics, has developed an FBS tool with R software and its Shiny package for FBS compilation at country level.

The FBS tool was tested in:
- a national training workshop in Colombo, Sri Lanka
- a regional workshop for African French-speaking countries in Dakar, Senegal
- a regional workshop for Asia-Pacific countries, in Daejeon, Republic of Korea

Within the framework of the Global Strategy’s technical assistance plan, the FBS tool is also used at country level in:
- AFRICA
  - Benin
  - Cameroon
  - Guinea
  - Madagascar
  - Mali
- ASIA PACIFIC
  - Cambodia
  - China
  - Sri Lanka
  - Viet Nam

DIETARY ENERGY SUPPLY (DES) ESTIMATES

The per capita estimates of caloric value for individual food products are then added together to obtain a country’s total daily per capita DES.
Examples of commodity tree, SUA and FBS layout

**EXAMPLE OF COMMODITY TREE AND CORRESPONDING SUA**

- Commodity tree for rice

This is a sample commodity tree and SUA table, in that not all products are produced from paddy rice in every country. Also, additional products may be produced from paddy rice, including rice bran oil, starch, beer, breakfast cereals, rice-based fermented beverages and cereal preparations not elsewhere specified (not elsewhere specified).

- Corresponding SUA of the commodity tree

<table>
<thead>
<tr>
<th>Product</th>
<th>Production</th>
<th>Imports</th>
<th>Exports</th>
<th>Stock change</th>
<th>Food</th>
<th>Food processing</th>
<th>Feed</th>
<th>Seed</th>
<th>Net Tourist Food</th>
<th>Industrial Use</th>
<th>Loss</th>
<th>ROU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy rice</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Husked rice</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Milled paddy rice</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rice bran</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Broken rice</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rice flour</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- Corresponding FBS line of primary equivalent after balancing and standardization

<table>
<thead>
<tr>
<th>Product</th>
<th>Production</th>
<th>Imports</th>
<th>Exports</th>
<th>Stock change</th>
<th>Food</th>
<th>Food processing</th>
<th>Feed</th>
<th>Seed</th>
<th>Net Tourist Food</th>
<th>Industrial Use</th>
<th>Loss</th>
<th>ROU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice (milled equivalent)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
AN EXAMPLE OF FBS LAYOUT

This example shows FBS of cereals but the complete FBS layout includes products of starchy roots, vegetables, fruits, sugar crops, meat, fish and sea food, etc.

<table>
<thead>
<tr>
<th>PRODUCTS</th>
<th>DOMESTIC SUPPLY (1 000 MT)</th>
<th>DOMESTIC UTILIZATION (1 000 MT)</th>
<th>PER CAPITA SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prod.</td>
<td>Impo.</td>
<td>Stock var.</td>
</tr>
<tr>
<td>Grand total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereals-excl. beer</td>
<td>19 677</td>
<td>6 208</td>
<td>398</td>
</tr>
<tr>
<td>Wheat</td>
<td>0</td>
<td>2 875</td>
<td>0</td>
</tr>
<tr>
<td>Maize</td>
<td>7 377</td>
<td>354</td>
<td>-8</td>
</tr>
<tr>
<td>Rice (milled eq.)</td>
<td>12 299</td>
<td>319</td>
<td>406</td>
</tr>
<tr>
<td>Barley</td>
<td>0</td>
<td>139</td>
<td>0</td>
</tr>
<tr>
<td>Rye</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Oats</td>
<td>0</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Millet</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Sorghum</td>
<td>1</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

To leverage the use of FBS in decision-making, FBS data and related metadata and analytical reports should be disseminated on the websites of NSOs or ministries of agriculture and in annual agricultural statistical abstracts.