Food and Agriculture Organization of the United Nations

METHODOLOGICAL PROGRESS ON THE COMPILATION OF THE FOOD BALANCE SHEETS

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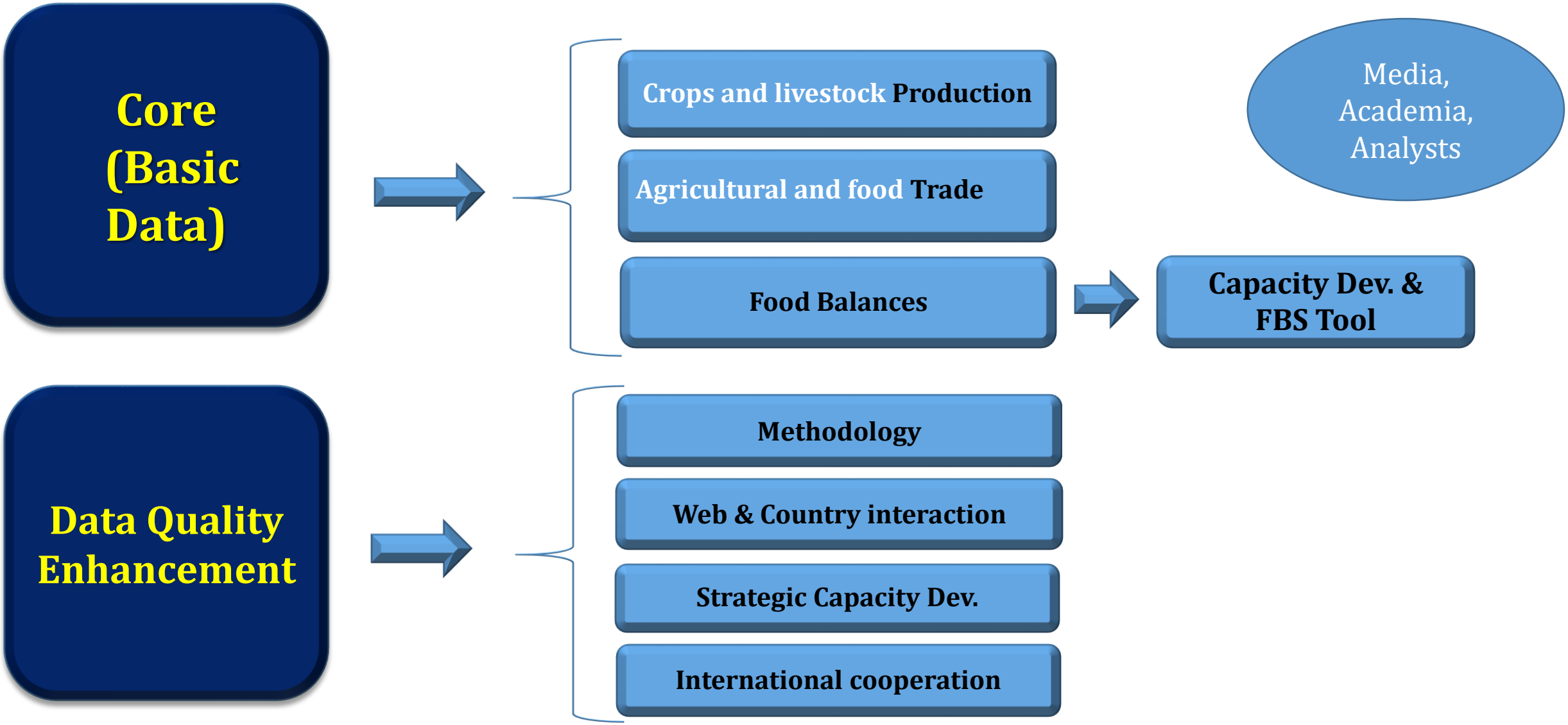
Outline

- ❑ Crops, Livestock and Food Statistics (CLFS) Team: Overview of Core Work
- ❑ **New methods for Food Balance Sheets (FBS)**
- ❑FBS Capacity Development
- ❑Challenges
- ❑Recommendations

CLFS Team: Overview of Core Work



1. Core work- Crops and Livestock Production Data

- Collect, process, and validated data on crops and livestock **production** (primary and processed commodities). Production includes **areas harvested**, **yields, live and slaughtered animal numbers**;

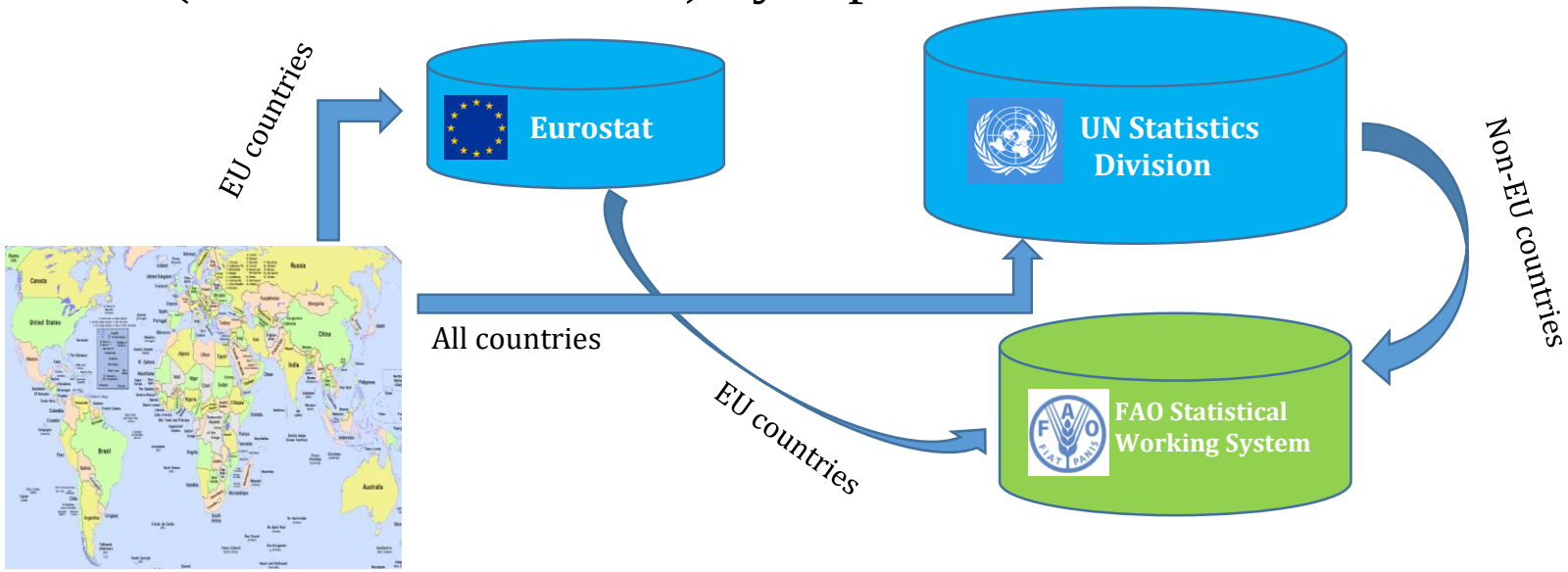
- Data are collected primarily through **Annual Production/Utilization Questionnaires** (APQs) sent to about 222 countries/territories **every year by mid-May**, and other data sources;

- Validated production data until 2018 are disseminated on FAOSTAT: http://www.fao.org/faostat/en/#data/QC

The more official production data we have, the better for FBS.

2. Core work- Agricultural and Food Trade Data

- Collect/harvest Annual international trade data for agricultural and food products for the world (about 200 countries) by reporter tariff line detail from:



- The data cover imports and exports in quantities, numbers and transaction values, by reporter and partner countries.

The more official trade data we have, the better for FBS.

2. Core work- Agricultural and Food Trade Data…

- Processed and validated data until 2017 are disseminated on FAOSTAT: http://www.fao.org/faostat/en/#data/TP

- Trade data imputations/estimations for agricultural and food products for all non-reporting countries (about 70) are generated using the mirrored statistics approach of the trade module and disseminated on FAOSTAT.
- 2018 trade data will be disseminated by mid-year 2020.

3. New methods-Food Balance Sheets (FBS)

The FBS is a national accounting/statistical framework that :

❑ brings together **various key data sets** (e.g. agricultural production, food trade, feed, seed, losses);

❑ acts as a **cross-validation tool** as well as the source of supply and utilization for each food item (Supply and Utilization Account-SUA) or food group (FBS);

❑ provides information on food ***availability*** for human consumption (in quantity & kcal);

❑ shows the **changes** in trends of food consumed.

❑Has capability to provide **micronutrient** information (minerals & vitamins), salt consumption and sugar intake: Future area of work.

3. New methods-Food Balance Sheets (FBS) …

The basic identity:
Within a given country in a given year, the sum of all aspects in the **supply** of a given product = the sum of **utilizations** for that product

This concept is expressed as : **Total supply = Total utilization**

As many countries do not collect - or share - data on stock levels for the majority of products, absolute opening and closing stock levels are replaced by **estimate of the change in stock levels** during the reference period.
The identity is written as:

Production + Imports – Δstocks* = Exports + Food + Feed + Seed + Loss + Industrial Use + tourism consumption + Residual Use (1)

(*) stock variation = amounts sent to (utilization), or withdrawn from (supply).

3. New methods-Food Balance Sheets (FBS) …

The basic identity can also be specified with an additional utilization variable: **food processing.**

Production + Imports – ΔStocks = Exports + Food + Food Processing + Feed + Seed + Loss + Industrial Use + tourism consumption + Loss + Residual Use (2)

Food processing is included as a utilization variable in the individual commodity balances (SUA). It is the link between the different level **SUA**s.

However, this variable is dropped in the final stages of FBS compilation to avoid double-counting.

3. New methods-Food Balance Sheets (FBS) …

Important additional variables:

In addition to supply and utilization variables mentioned above, complete FBS compilation (including estimates of per capita nutrient availability) requires several additional variables:

- **Population:** Estimates of population (from UN World Population Prospects) are needed to convert aggregate national nutrient supplies into per capita nutrient supplies.

- **Nutrient conversion factors** allow to derive estimates of the amount of calories, fat, and protein available for consumption by a country's population.

These estimates are derived from the final "food" quantities in the SUA for each product by the nutrient conversion factors to those quantities.

Details can be found on:
http://www.fao.org/fileadmin/templates/ess/ess_test_folder/Food_security/Excel_sheets/Nutritive_Factors.xls

3. New methods-Food Balance Sheets (FBS) …

Important additional variables:

- **Extraction rates** reflect the loss in weight in the conversion (or processing) of one product into another. Extraction rates are **expressed as a percentage**, and are calculated as the amount (by weight) of derived product that is produced using a given amount of input product.

$$Extraction\ rate = \frac{Quantity\ of\ output}{Quantity\ of\ input} \qquad (3)$$

e.g. to produce 80 MT of maize flour, 100 MT of maize are needed:

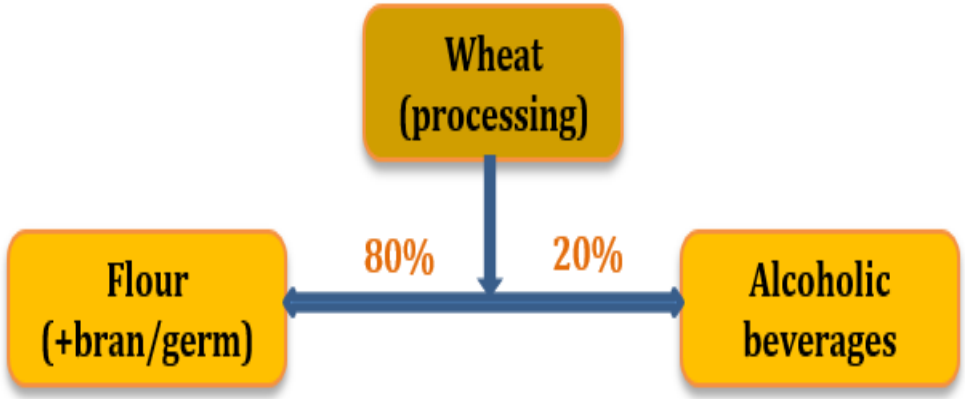
$$Extraction\ rate = \frac{80\ MT\ maize\ flour}{100\ MT\ maize} = 0.8 = 80\%$$

3. New methods-Food Balance Sheets (FBS) …

Important additional variables:

Processing shares are percentages of the amount of a given commodity sent to different processing paths.

Example:

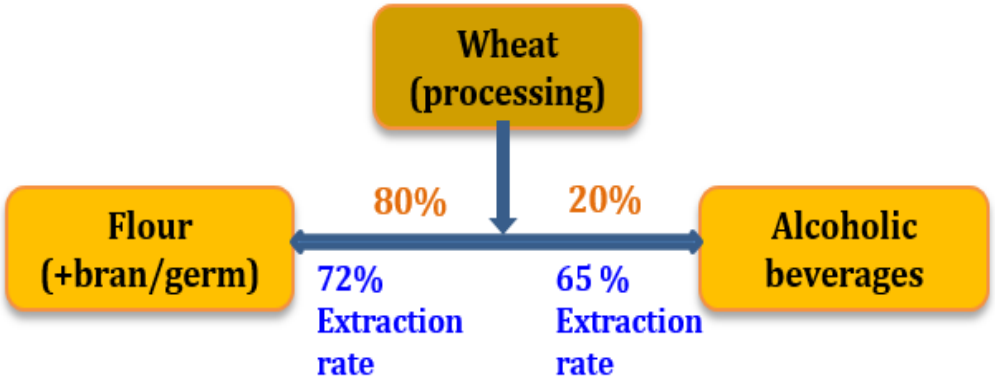


These are necessary for FBS because goods can be processed into an array of derived products, and the input used for the production of these derived goods is seldom known with certainty.

3. New methods-Food Balance Sheets (FBS) …

Important additional variables:

Furthermore, **shares** can be applied to the amount of a good sent to processing to calculate the amount of input into a given transformation process, and then an extraction rate can be applied to those inputted quantities to derive a production estimate as illustrated below.



3. New methods-Food Balance Sheets (FBS) …

Supply Utilizations Accounts and link to the Food Balance Sheet:
Supply Utilization Accounts (SUAs) and FBS are linked through the **standardization and aggregation** using **commodity trees**. Under SUA, supply and utilization occur for each both primary and derived products are converted into **primary commodity equivalent** through aggregation under FBS compilation stage.

SUA

- Are the accounting balances for all **individual products**
- Supply and utilization occurring for each product, **both primary and derived**

FBS

- **Primary commodity equivalent aggregate level** (in order to facilitate interpretation)
- **Doesn't provide a holistic picture** on how the commodity is being consumed, traded, or otherwise used after being processed into various derived products.

3. New methods-Food Balance Sheets (FBS) …

Supply Utilizations Accounts and link to the Food Balance Sheet:

SUAs can include several different levels of processing**.**
For example,
- Soybean (1) is processed into soybean oil and cake (2a), and/or processed into soy sauce (2b)
- Soybean oil (2a) is processed into margarine or shortening (3a) and/or hydrogenated oils and fats (3b)

The derived product quantities of each of these subsequent processing levels is related to the **extraction rate.**

Production quantity (output) = Quantity of input * Extraction rate (4)

Example: Quantity of soybean oil = 100 MT soybean * 0.18 = 18 MT

3. New methods-Food Balance Sheets (FBS) …

Supply Utilizations Accounts and link to the Food Balance Sheet:

Likewise, in the **standardization process** the inverse extraction rate is used:

$$\textit{Quantity of input (“for processing”)} = \frac{\textit{Quantity of output}}{\textit{Extraction rate}} \qquad (5)$$

Note: It is incorrect to simply add the quantities of primary and derived products together.

Derived products must first be converted back to their **“primary commodity equivalent”** and then all of the primary commodity equivalents can be added together to arrive at one overall aggregate and balance.

3. New methods-Food Balance Sheets (FBS) …

Commodity trees

Most food manufacturing commodities produce multiple outputs, and it is even possible for those outputs to undergo further transformation into second-level derived goods.

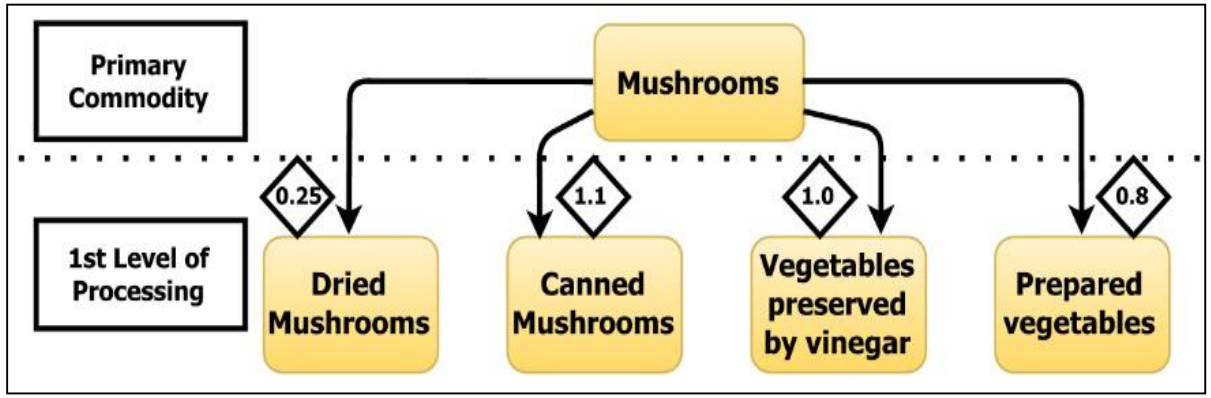
In order to better conceptualize these primary/derived product relationships, commodities and their derived products are organized into "**commodity trees**".

Commodity trees "stem" from **one primary product** and then branch out into one or more successive levels of **processed products**, with each level **linked by extraction rates**. They are designed to be exhaustive.

3. New methods-Food Balance Sheets (FBS) …

Commodity trees …

Example 1: Mushroom Commodity Tree

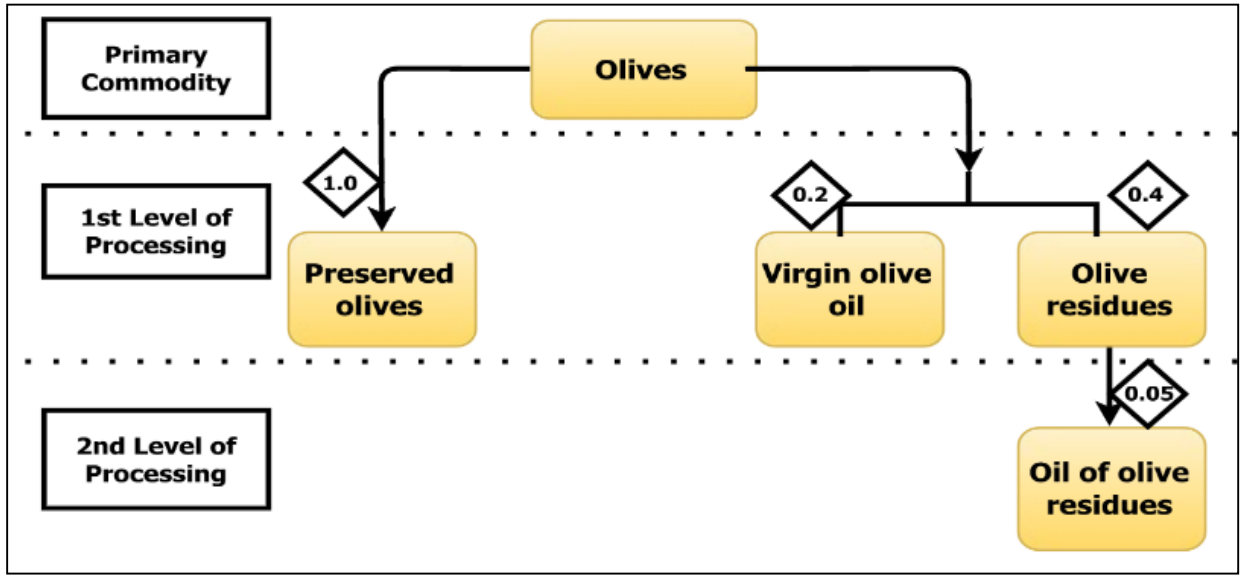


- the primary commodity "mushrooms" can be processed into **4 different derived products;**
- the extraction rate for each of these conversion processes is noted in the diamond above each derived product.

3. New methods-Food Balance Sheets (FBS) …

Commodity trees …

Example 2: Olive Commodity Tree



Multiple products that are produced **from a single transformation process** are called **co-products.**

3. New methods-Food Balance Sheets (FBS) …

The balancing mechanism

The balancing mechanism is important because supply-side variables are often measured data (e.g. production and import quantities), while most utilization-side variables are imputed or estimated (e.g. loss, feed) resulting most often in an **unbalanced equation**.

Therefore, the balancing mechanism balances supply and utilization in quantity terms through **balancing food products at each SUA level**, standardization and aggregation by FBS group and **balancing at the primary equivalent FBS level.**

3. New methods-Food Balance Sheets (FBS) …

The balancing mechanism (key improvements)…

- The balancing mechanism has been modified in the sense that there is **no unique variable taking high weight of being a balancer**. All statistical discrepancies are spread across imputed variables.
- Imputation of derived products have been improved through the use of processing shares as a 3-year moving average, and the overall **imputation process is much more automated** than before to minimize manual interventions.
- The overall SUA/FBS process is **standardized and formatted** further and there are less personal discretion on adjustments to be made.
- **Stock module** has been developed with more reliable stock data, and stock variations are more constrained on the basis of successive official and semi-official data.
- **Loss module developed and data are updated** with more interactions with countries.

For the first time, 2014-2017 FBS data using the **new FBS methodology** have been disseminated in FAOSTAT: http://www.fao.org/faostat/en/#data/FBS

3. New methods: **Key differences between new and old FBS methodology**

- **Balancing-** one balancer variable takes on the outstanding unbalanced amounts (old) vs. spread the imbalances out among all the components (new);

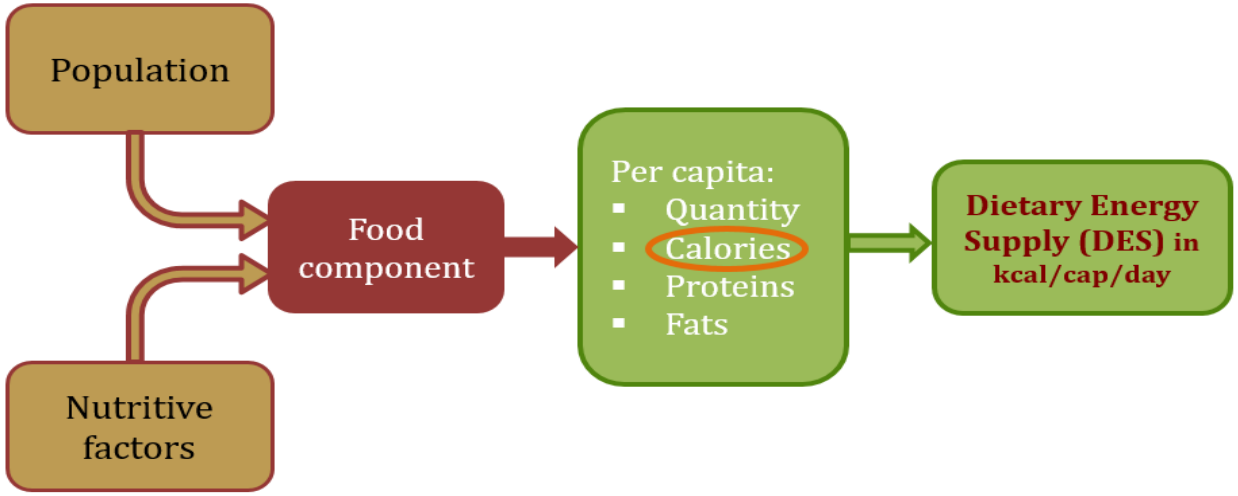
- **Food module** in year t in the new methodology is heavily influenced by food t-1 (food quantities assumed to be comparable);

- **Population-** FBS for 2014-17 use 2019 UNPD population data, while the series up to 2013 used the 2015 (or even earlier) version UNPD population data (most impact on the food availability per person);

- **Food basket per country-** new FBS methodology does not alter this between the old and new series.

3. New methods-Food Balance Sheets (FBS) …

Interpreting FBS data:



- **" Food availability", not "food consumption"**
  - DES is likely to overestimate the amount of food actually consumed
  - FBS food availability takes into accounts all consumption within a country (HH, schools, hospitals….)
- **Average** of food/nutrient availability (distribution among different groups of people, urban/rural or regions of a country are not considered).

3. New methods-Food Balance Sheets (FBS) …

Interpreting FBS data:

- **Commodity Balances ≠ FBS**
  - FBS : only food-related commodities (e.g. rubber is not included)
  - FBS : the quantity estimates of food must be reported in their caloric equivalent
  - FBS : contains aggregated estimates of both a primary commodity and all of its derived products (expressed at the primary commodity equivalent level).
    - many countries produce commodity balances for primary products→ **underestimate** total consumption

3. New methods-Food Balance Sheets (FBS) …

Potential Uses of the FBS:

- **Basis for policy analysis aimed at ensuring food security:**
  - Estimate a country's overall **DES** and macronutrient availability (proxy of food consumption)
  - Provide **micronutrient** information (minerals & vitamins), salt consumption, sugar intake: area of work coming up soon
  - Estimate the food shortages/surpluses
  - Estimate the amount of food aid
  - Determine the availability of a certain class of food
  - Inform agricultural trade policy
  - Determine how prices affect food availability
  - Analyze livestock policies (e.g. the degree to which primary food resources are used to produce animal feed)

3. New methods-Food Balance Sheets (FBS) …

Potential Uses of the FBS:

- **Calculation of derived indicators:**
  - Estimate Dietary Energy Supply Adequacy (as a % of the Average Dietary Energy Requirement –ADER)

$$\text{DES adequacy} = \frac{\text{DES}}{\text{ADER}}$$

  - Self-sufficiency ratio (SSR): P as % of dom. Supply

$$\text{SSR} = \frac{\text{Production}}{\text{Production + Imports - Exports}}$$

  - Import dependency ratio (IDR)

$$\text{IDR} = \frac{\text{Imports - Exports}}{\text{Production + Imports - Exports}}$$

3. New methods-Food Balance Sheets (FBS) …

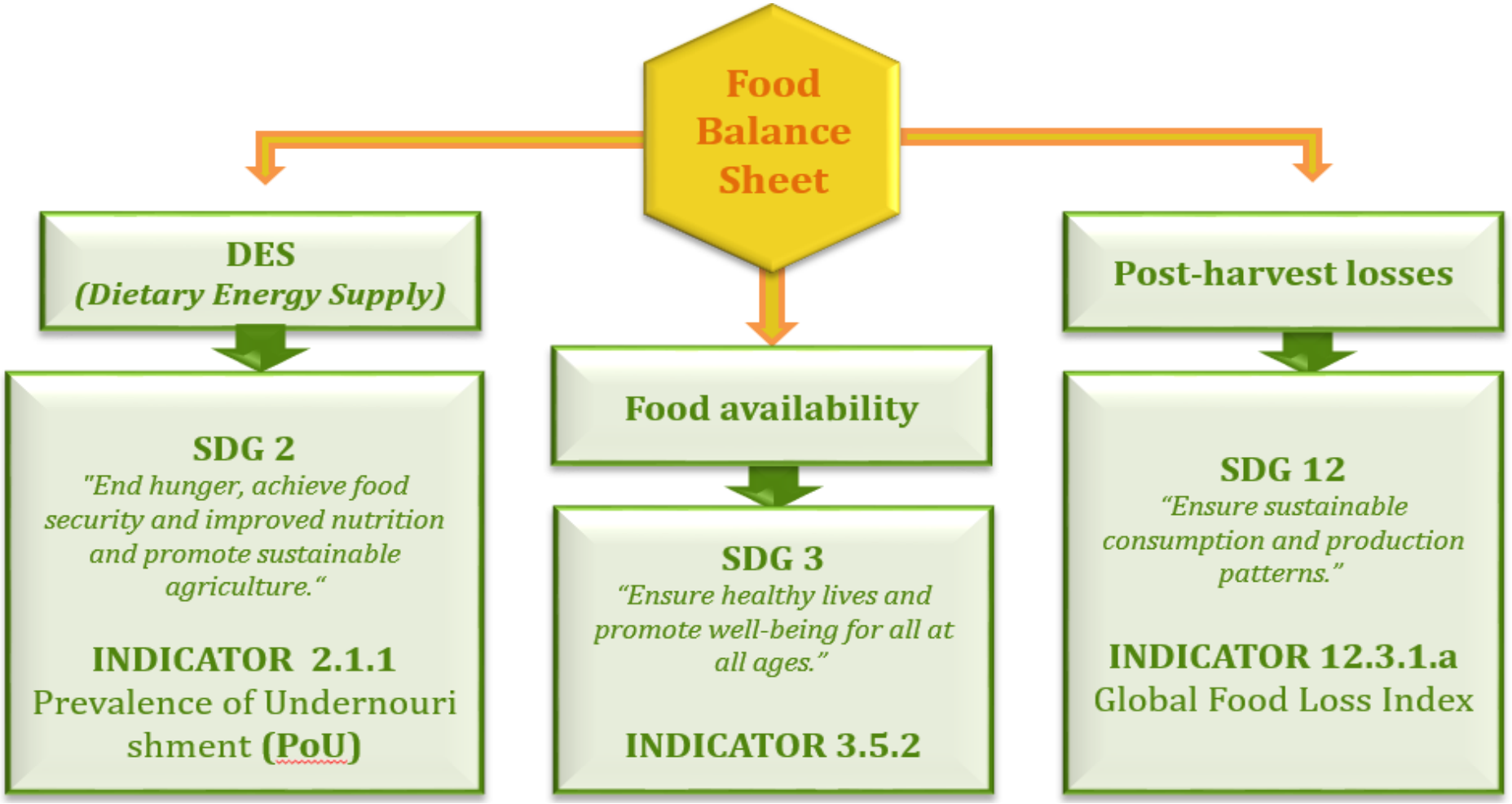
Potential Uses of the FBS:

- **Statistical purposes :**
  - Framework for data reconciliation (≠ sources)
  - Harmonization of data collection efforts
  - Data validation (supply and demand picture)
  - Improve National Account estimates
  - Means of comparing food availability (from FBS) and food consumption (from HH surveys)

  e.g. to cross-check the data on food consumption (and *vice versa);* as a proxy of food consumption in the absence of data.
  - Comparing food availability across time
  - Track changes in dietary composition & growth of consumption in new products.

3. New methods-Food Balance Sheets (FBS) …

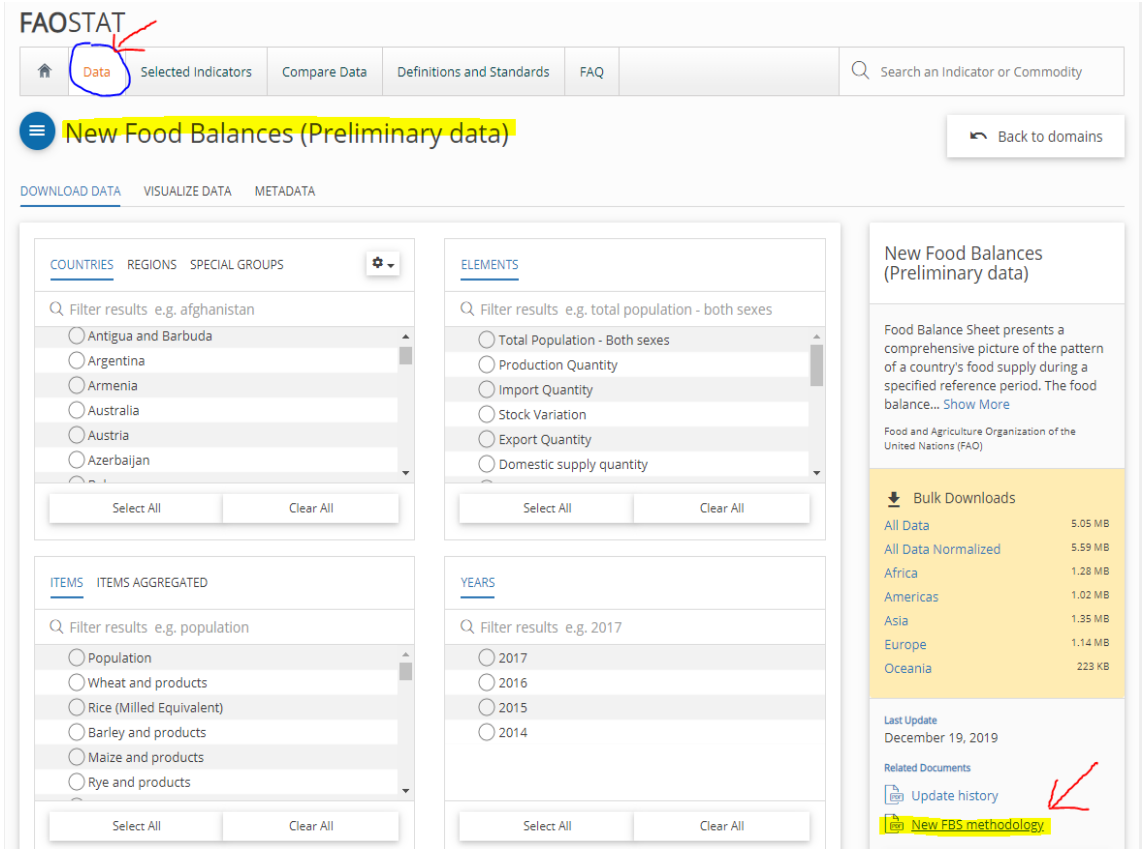
The contribution of the FBS to the SDGs:



3. New methods-Food Balance Sheets (FBS) …

Updated FBS data in FAOSTAT

2014-2017 FBS dated compiled based on new methodology are disseminated in FAOSTAT: http://www.fao.org/faostat/en/#data/FBS (live demo)



4. FBS- Capacity Development (CD) …

The FBS CD aims to provide a country, upon direct official request, with capacities for the compilation and analysis of Food Balance Sheets (FBS), ideally on a regular annual basis.

The FBS provide a **cost-effective**, quick and quite precise picture of the food and agricultural sector, with relevant data for conducting national food security assessments according to internationally established methodologies.

The technical assistance is based on the new revised/improved methodology for the FBS compilation, recently developed by the FAO Statistics Division. The **new FBS country compilation tool** (R based Shiny app) allows countries to compile the national Supply Utilization Accounts (SUA), the related FBS and estimate the Dietary Energy Supply (DES) in kilocalories per capita per day.

In addition, FBS also provide inputs to the computation of SDG indicator 2.1.1 (prevalence of undernourishment, or PoU) in the **absence of household budget and nutrition survey data** (usually expensive) and SDG indicator 12.3.1 (Global food loss index).

4. FBS- Capacity Development (CD) …

We have been supporting countries in the region to compile national FBS using the country FBS compilation tool based on the new FBS methodology.

This capacity development is usually in the form **3-5 technical support missions, with 4-5 days each** over a period of 1-1.5 years, for a country to be able to compile FBS on its own.

Since 2014, the FBS CD was provided to the following countries in the region:

1- China

2- Mongolia

3- Malaysia

4- Bhutan

5- Tajikistan

6- Azerbaijan

7- Laos

8- Nepal

5. Challenges

- ❑ Lack of data for utilization variables (loss, feed, seed, industrial utilization) at country and/or regional level;
- ❑ Improve response rate for FAO Annual Production and Utilization Questionnaires by member countries;
- ❑ Access to national publication of national FBS compiled by member countries;
- ❑ Identify funding for numerous country requests for FBS Capacity Development;
- ❑ Feedback from countries on the quality of FAO disseminated data.

6. Proposed recommendations

- The **FAOR offices** should be encouraged and supported to include the ESS/team work in the Country Programming Framework (CPF) and to allocate **TCP funds** for related capacity development;
- Member countries should **channel FBS requests through FAO country offices** and regional statisticians;
- Countries should ensure **national FBS are compiled, disseminated and shared with FAO Statistics Division** after FBS capacity development activities are completed;

For Discussion:

- Countries should provide **their views on how to increase FAO annual agricultural production/utilizations questionnaires response rate** (important input data for FBS compilation).

Thank you!

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