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Food and
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Продовольственная и
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Organización
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para la
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ASIA AND PACIFIC COMMISSION ON AGRICULTURAL STATISTICS

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Agenda Item 7.3a

**New Methodological Framework for Compilation of
country- led Food Balance Sheet**

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Presentation Outline

1. Concept of Food Security and its Dimensions
2. SUA/FBS: Potential uses including SDG Monitoring
3. Basic SUA/FBS: identity and approach
4. Definitions of SUA/FBS components
5. New Changes including Balancing mechanisms
6. Requisite Steps for SUA/FBS compilation at country level

Definition and Dimensions of Food Security

- “Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life
- There are four dimensions of Food Security
 - Availability
 - Access
 - Utilization and
 - Stability
- Food Balance Sheet is closely related with the Availability Dimension of food security

History of Food Balance Sheet

- World War I: **first attempts** at preparing FBS
- 1936: preparation of a systematic international **comparison of food consumption**
- 1942-43: 1st intensive use of FBS to **analyze the food security situation** after the World War II
- 1949: printing of the *Handbook for the Preparation of Food Balance Sheets*
 - FBS were published for 41 countries and since then it's regularly prepared and published
- 1977: food balance sheets for **162 countries**
 - table of per caput food supplies showed [cal., prot., fat] the supply by food groups of **selected minerals and vitamins**

History; new methodological changes

- \approx 2015: intensive focus of finalizing the revised FBS methodology.

Same overall framework, but important innovations.

Main changes:

- a) Updating the overall approach solve the balance (more refined)
- b) Updating/refining the imputation methods of the FBS components – harness links between the various FBS variables/elements and information from outside the FBS
e.g. the new feed use imputation method (animal number, type of breeding...), seed use, stock
- c) More accuracy with the various variables
e.g. other utilization \rightarrow tourist food, other utilizations
- d) Less discretion of the compiler
- e) International classifications adopted (FCL replaced by CPC and HS)

Definition of SUA and FBS

The **FBS** is a national accounting/statistical framework, presenting a comprehensive picture of the pattern of a country's food supply during a specified reference period.

SUPPLY = UTILIZATION

$$P + I - dSt = X + Fo + Fe + Se + T + IU + Lo + ROU + \text{food processing}$$

Where:

P = production

I = imports

dSt = Δ stocks

Fo = food

Fe = feed

Se = seed

T = tourist food

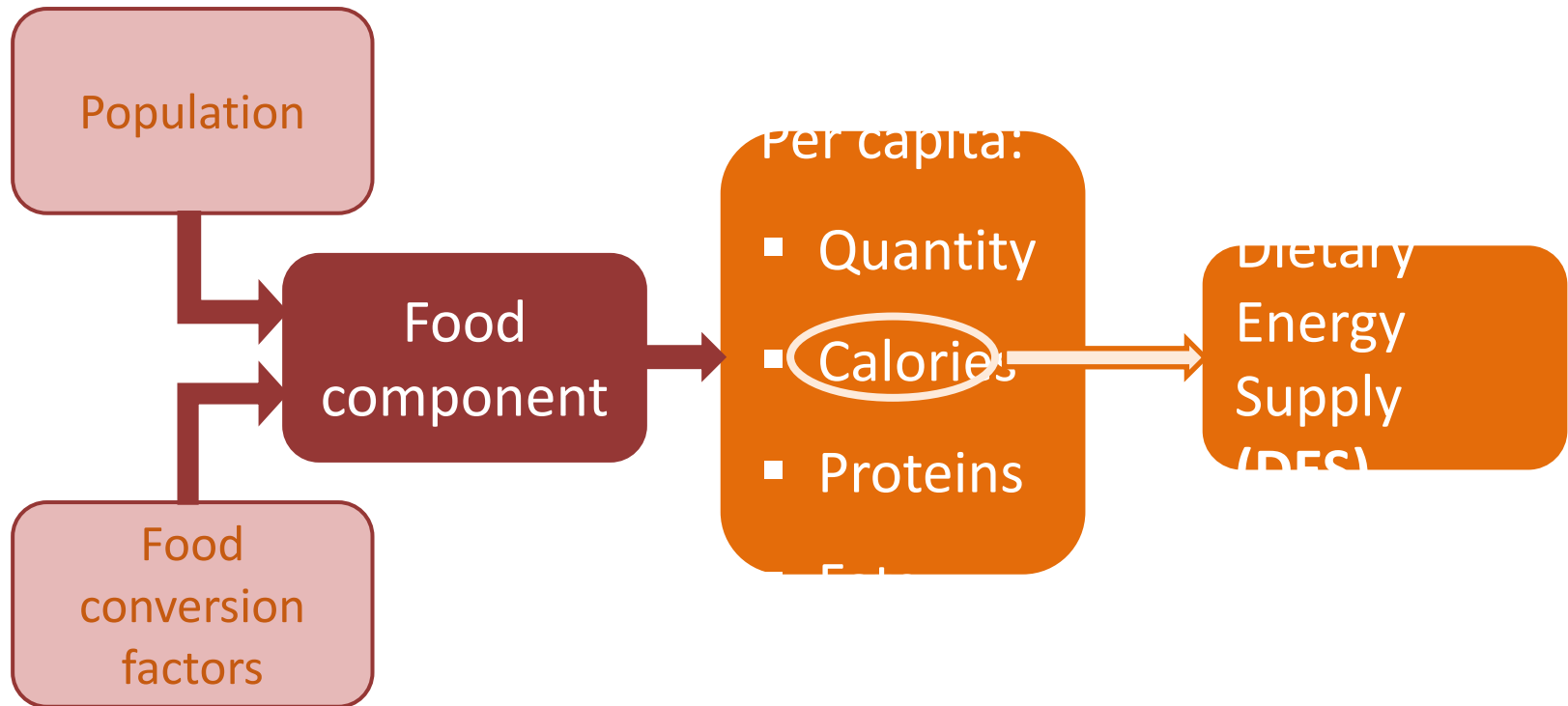
IU = industrial Use

Lo = Loss

Rou = Residual or other uses



Definition/Process of SUA and FBS



Potential Uses

- **Basis for policy analysis aimed at ensuring food security:**
 - Estimate the food shortages/surpluses
 - Estimate the amount of food aid
 - Estimate a country's overall DES and macronutrient availability (proxy of food consumption)
 - Determine the availability of a certain class of food
 - Analyze livestock policies (e.g. the degree to which primary food resources are used to produce animal feed)
- **Calculation of derived indicators:**
 - Prevalence of Undernourishment (PoU)
 - Self-sufficiency ratio (SSR)
 - Import dependency ratio (IDR)

Potential Uses

- **Statistical proposes:**
 - Framework for data reconciliation, Harmonization of data collection efforts and Data validation
 - Improve National Account estimates,
 - Means of comparing food availability (from FBS) and food consumption (from HH surveys)
 - Benchmarking (compare food availability across countries, over time)
 - Track changes in dietary composition & growth of consumption in new products
 - Determine how prices affect food availability
 - Link to two SDG indicators (2.1.1 & 12.3.1)

The contribution of the FBS to the SDGs

Achieving the 2030 Agenda for SD

17 Goals

169 Targets

231 Indicators

- 21 Indicators a
under FAO's
mandate



The contribution of the FBS to the SDGs

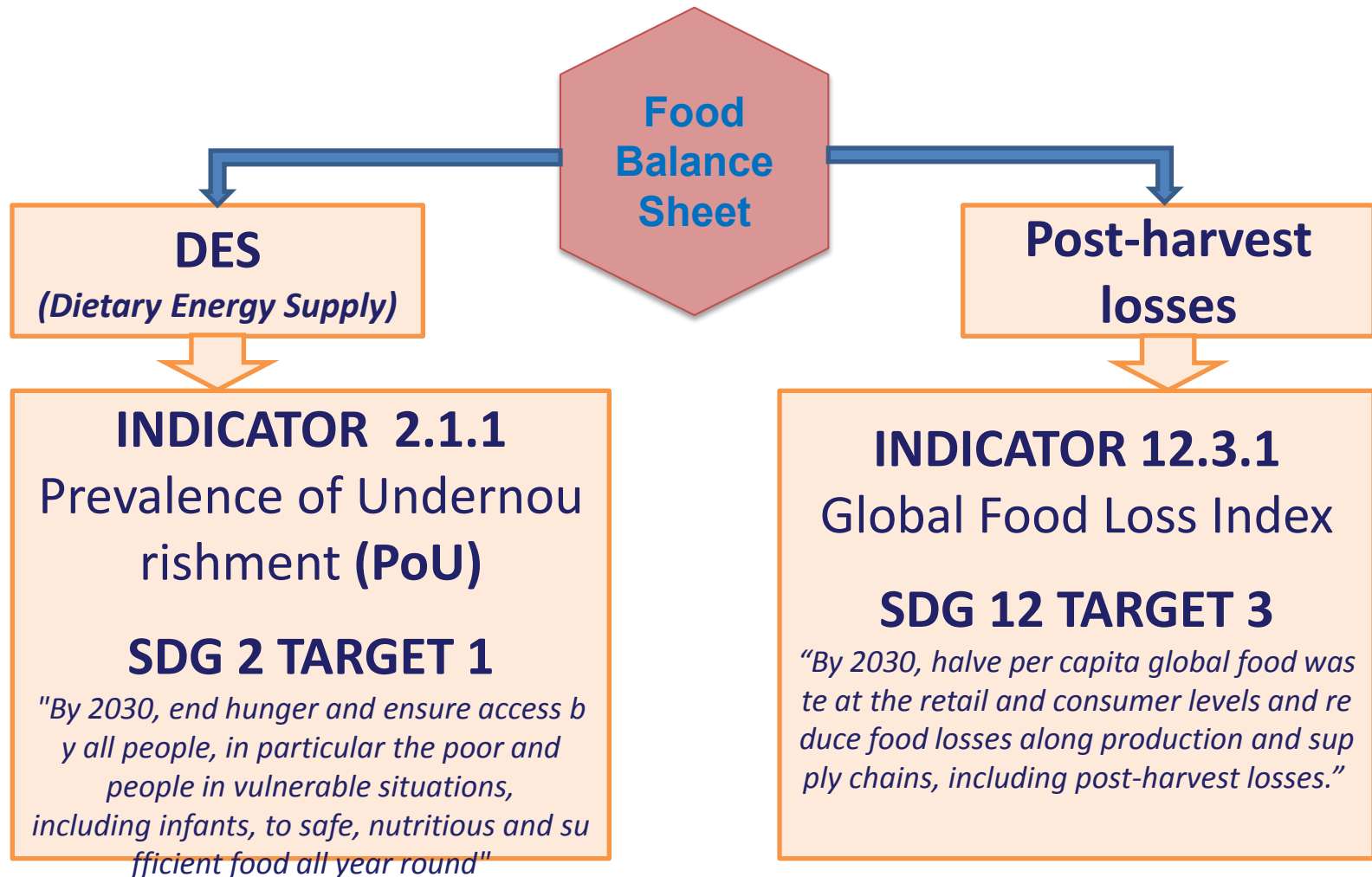
Achieving the 2030 Agenda for SDG

17 Goals
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- **21** Indicators a
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 - **2.1.1**
 - **12.3.1**



The contribution of the FBS to the SDGs



The basic identities

- Basic premise of FBS :

➤ 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

a) Domestic supply = Domestic utilization b) Total supply = Total utilization

Supply (t)	Utilization (t)
Production	Food (+for processing)
Imports	Feed
– Exports	Seed
ΔStocks	Tourist
	Industrial use
	Loss
	Residual
Domestic supply	Domestic utilization

Supply (t)	Utilization (t)
Production	Exports
Imports	Food (+for processing)
ΔStocks	Feed
	Seed
	Tourist
	Industrial use
	Loss
	Residual
Total supply	Total utilization

Additional variables

In order to compile the complete FBS (including estimates of per capita nutrient availability) several additional variables are required:

- **Population (UNPD)**
 - UNPD definition : “*de facto* population in a country, area or region as of 1 July of the year indicated”.
- **Nutrient Estimates**
 - Nutrient estimates allow to derive **estimates of the amount of calories, fat, and protein available** for consumption by a country’s population.
- **Activity and productivity variables: Area shown/harvested, Carcass weight, Off take rate etc**
- **Extraction rates** : loss in weight in the **conversion (or processing) of one product into another.**
- **Processing shares:** Percentages of the amount of a given commodity sent to processing

Supply Utilization Accounts (SUAs) and FBS

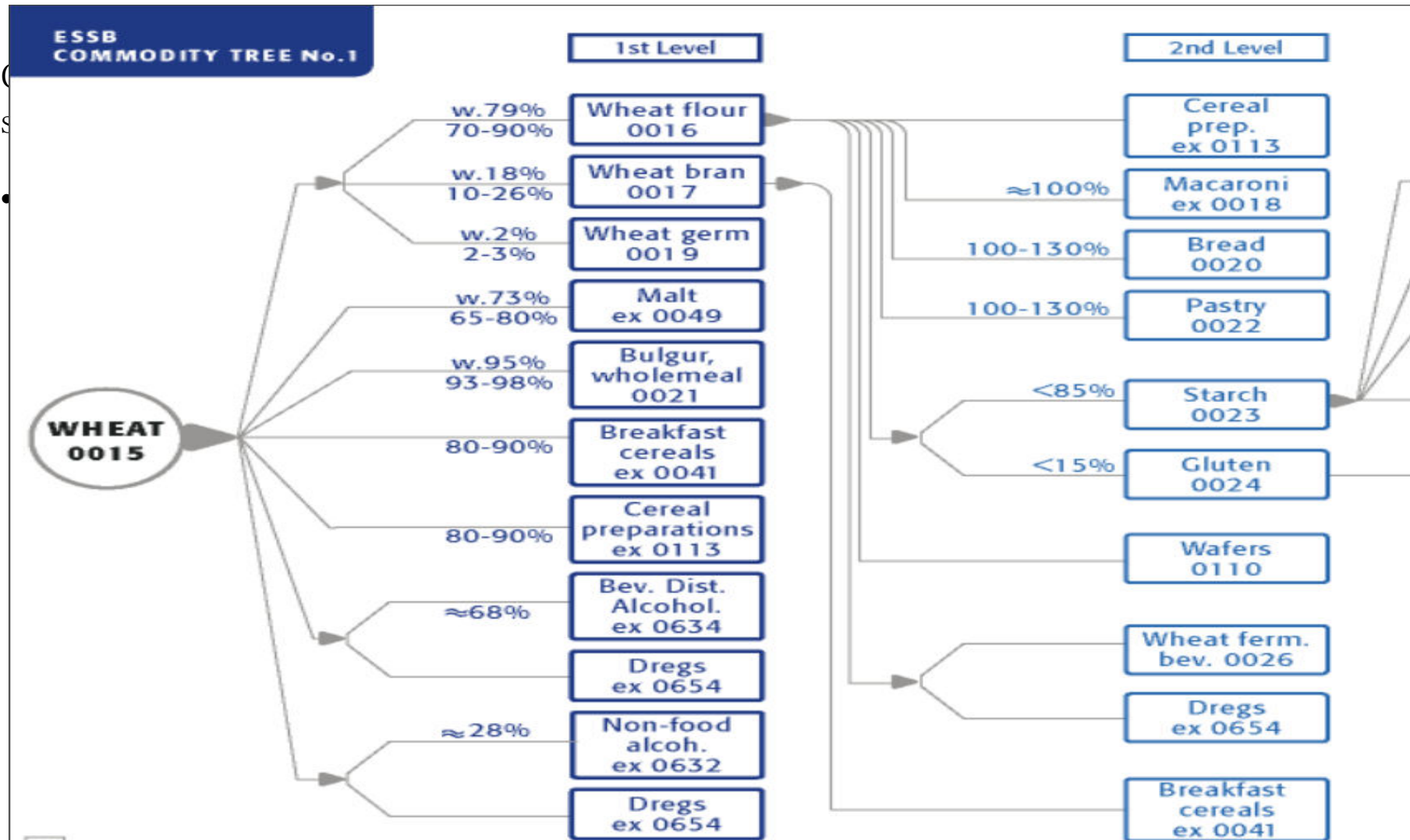
Exemple of SUA table for paddy rice

Product	Production	Imports	Exports	Stock change	Food	Food processing	Feed	Seed	Net Tourist Food	Industrial Use	Loss	ROU
1 Paddy rice	-	-	-	-	-	-	-	-	-	-	-	-
Husked rice 2	-	-	-	-	-	-	-	-	-	-	-	-
Milled paddy rice 2	-	-	-	-	-	-	-	-	-	-	-	-
Rice bran	-	-	-	-	-	-	-	-	-	-	-	-
Broken rice	-	-	-	-	-	-	-	-	-	-	-	-
Rice flour 3	-	-	-	-	-	-	-	-	-	-	-	-

For each primary commodity family, compilers should elaborate SUAs for both the primary commodity in question and all of its derived sub-products, which can include several different levels of processing.

Each of these subsequent processing levels is linked back to the previous level through an extraction rate.

Commodity Trees



New Changes

- Flags

Source	Flag
Official	
Semi-official	T
Imputed	I
Expert estimation	E

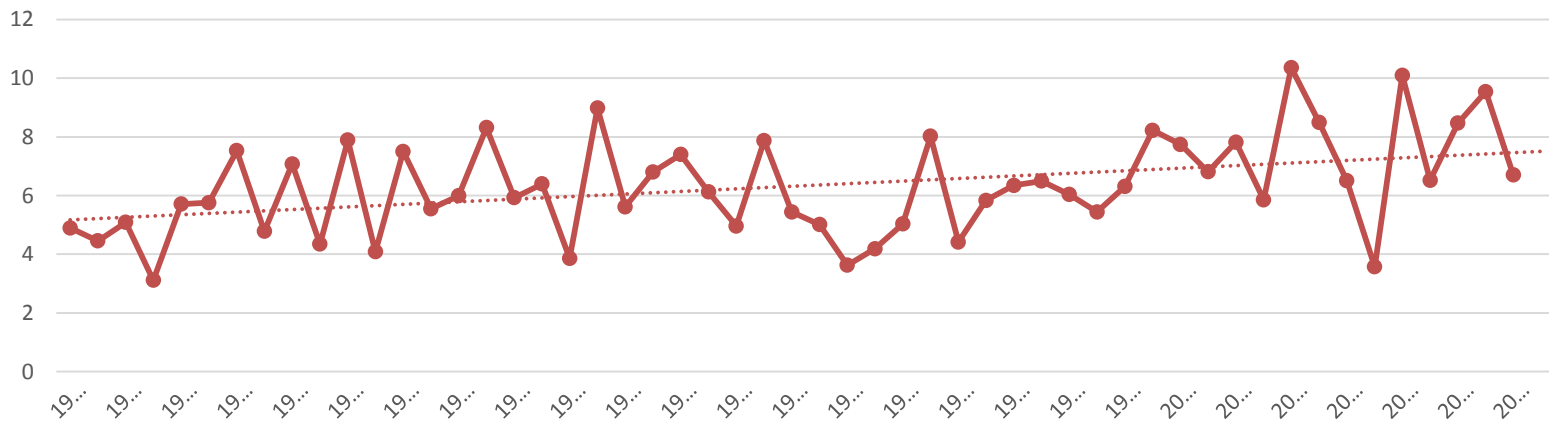
- Tolerance Limit (Confidence Interval)

Variable	Confidence	Tolerance interval
Production	1.0	$\pm 0\%$
Trade	1.0	$\pm 0\%$
Stocks	0.75	$\pm 25\%$
Food	0.90	$\pm 10\%$
Food processing	1.0	$\pm 0\%$
Feed	0.75	$\pm 25\%$
Seed	0.90	$\pm 10\%$
Tourist Food	0.75	$\pm 25\%$
Industrial Use	0.75	$\pm 25\%$
Loss	0.75	$\pm 25\%$

New Changes

- Area/Yield Imputation using time series data

Yield (in MT/HA)



- Stock Estimation

$$\Delta Stocks_t = f(\Delta ProdNT_t) + \varepsilon_t$$

Where:

$\Delta Stocks_t$ is equivalent to $Closing Stocks_t - Closing Stocks_{t-1}$,

$\Delta ProdNT_t$ is equivalent to

$[Production + Imports - Exports]_t - [Production + Imports - Exports]_{t-1}$,

and

ε_t is an error term

New Changes

- Estimation of Food

$$Food_t = \frac{Population_t}{Population_{t-1}} * Food_{t-1} * \left[1 + \epsilon \log \left(\frac{Household\ consumption\ expenditure_t}{Household\ consumption\ expenditure_{t-1}} \right) + \phi \right]$$

- Feed

$$FD = \sum_i N_i * e_i(\text{energy requirement})$$

- Seed

$$Sown\ area_{t+1} = (\overline{RatioSH}) * Harvested\ area_{t+1}$$

$$Seed\ use\ (MT)_t = Seeding\ rate\ \left(\frac{MT}{HA}\right) * Sown\ area\ (HA)_{t+1}$$

New Changes

- **Tourist Food**

$\begin{aligned} NetTF = & [\#Incoming\ visitor\ days \\ & * \textit{Daily food availability for visitors}] \\ & - [\#Outgoing\ traveler\ days \\ & * \textit{Daily food availability for residents}] \end{aligned}$	
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- **Loss**

$\begin{aligned} \textit{Quantity of Loss} \\ = \textit{Quantity of Production} * \textit{Estimated \% Loss} \end{aligned}$	
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The revised FBS balancing:

calculate the imbalance from the supply = utilization identity

$$Imb = P + I - dSt - X - Fo - Fe - Se - T - IU - Lo - ROU$$

where: *Imb* is the imbalance for a given commodity in a given country

Note that:

- in this step, the imbalance is calculated from the variable point estimates
- No accounting has yet been made for the measurement error...that follows in Step 2

The recommended balancing mechanism (Example)

The recommended approach

Example: FBS compilers in Country Z have produced the following unbalanced SUA table for sorghum in their country.

Line	Product	Production (1)	Imports (2)	Exports (3)	Feed (4)	Seed (5)	Loss (6)	
A	Sorghum	892	307	48	1061	3	44	
B	Imbalance for A							43
C	Measurement error (in %)	15.0%	0.0%	0.0%	40.0%	15.0%	15.0%	

- Line A: point estimates
- Line B: imbalance ($imb = P + Im - Ex - Fe - Se - Lo$)
- Line C: measurement errors

Steps for Compilation of Supply Utilization Account (SUA)/Food Balance Sheet (FBS)

STEP1: Formation of a National Technical Working Group (NTWG)

- A National Technical Working Group will be responsible for:
The indicative membership of the NTWG shall be:
- **Coordinator:** Director, Agriculture Division, National Statistics Office or Ministry/Department of Agriculture (whoever is responsible),
- **Members:** National Statistics Office,
 - Population section, National account section, Agriculture section, Livestock section, Trade section, Fisheries section etc.
- Ministry or Department of Agriculture, Department of Livestock, Department of Fisheries, Department of Food, Department of Health and Nutrition, Department of commerce and trade, Academia and university representatives

Steps for Compilation of Supply Utilization Account (SUA)/Food Balance Sheet (FBS)

Step 2: Conducting of 5-day National Training Workshop (NTW) on SUA/FBS

The workshop will involve lectures and hands-on exercises on software to be provided by FAO under the guidance of FAO resource persons. It is expected that the Coordinator makes sure the availability of following data to be used in the workshop:

Supply Side Variables

Utilization Variables

Other Variables

STEP 3: Follow-up work by participants on data entry and validation (about 3 months)

Remote support will be provided by FAO

Step 4: Holding of National FBS validation workshop (3days)

Step 5: Writing of Report on Nation Food Security and Dissemination (optional based upon country request)

Thank you