“SDG 12.3.1.a Food Loss Index”
Understanding and building the indicator

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Objectives

• Understand the SDG target 12.3 and indicator 12.3.1
• Process in developing the indicator
• Understand the difference between measuring and reporting on food losses at country-level and at disaggregated level
• Clarity on definitions, concepts and boundaries
• How to set priorities and address the challenges
• How to calculate the Country Food Loss Index (FLI) and Global Food Loss Index (GFLI)
  – How it is interpreted
  – What goes into the index
“By 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses”

GOVERNANCE AND INSTITUTIONAL ARCHITECTURE
State of Play: SDG 12.3 target and indicators

Food Loss Index
Focuses on the supply side of the market and decreasing losses in the supply chain

Waste Index
Focuses on retail and consumer sectors and improving the efficiency on the demand side of the supply chain

"By 2030, ...

12.3.1 Food Loss
"...reduce food losses along production and supply chains, including post-harvest losses."

12.3.2 Food Waste
"...halve per capita global food waste at the retail and consumer levels."
Process towards a FLI

- 2011: The measurement of Postharvest losses was a priority research topic set by countries for the Global Strategy to Improve Agriculture Statistics
- 2012-2014: consultative process led by FAO towards a Conceptual Framework for Food Losses and Waste
- June 2014: Malabo Declaration, to have PHL by 2025
- November 2015: SDG 12.3 was classified Tier III
- 2016: A Global Food Loss Index was designed with a loss imputation model
- October 2016: ICAS VII
- 2017: UNGA accepted the Global Food Loss Index Concept
- 2014-2017: Guidelines for the measurement of harvest and postharvest losses of grains
- September 2017: external consultation organised by FAO on the measurement of Food Losses and Waste
Process towards a FLI

- September 2017: external consultation organised by FAO on the measurement of Food Losses and Waste
- November 2017: the IAEG-SDG requested additional testing of the GFLI and additional data Guidelines for Data collection
- 2018: Publication of the guidelines for Grains
- 2018: draft guidelines for Fruits and Vegetables, Milk and Meat, Fish
- April 2018: first Training on the FLI and scrutiny by the trainers
- October 2018: field test of the Guidelines for Fruits and Vegetables and Milk and Meat
- September 2018: pilot test of the FLI in India
- November 2018: Upgrade to Tier II, separation of the Food Loss Index and Food Waste Index
SDG Indicator 12.3.1 - Challenges

- Lack of shared and internationally agreed concepts and definitions
- Lack of international guidelines on how to define and collect postharvest losses and waste data
- Reliable nationally representative data on losses are generally not available (7% official data reported yearly in FAOSTAT)
  - Mainly case studies based on expert opinions focused on few products or stages of the value chain
  - 42 Countries reported in 2019
- Complexity of measurement: cost, multiple dimensions (stages of the value chain, typologies of actors, product characteristics, value chain length and complexity)
- Reporting both the national and international indicators in a comparable way
Boundaries between the FLI and the FWI

- Extreme Events
  - SDG 1.5

- Pre-harvest/Pre-slaughter
- Harvest/Slaughter
- On-farm Post-harvest/Slaughter Operations
- Transport Storage Distribution
- Processing & Packaging
- Retail
- Public & Household Consumption

- Losses in the FBS

- Food Loss Index
  - SDG 12.3.1.a

- Food Waste Index
  - SDG 12.3.1.b

- Harvest losses can be added to the index coverage and measured with crop-cutting surveys

- Food Losses Index at the national level
  - SDG 12.3.1.a
From the external consultation the following rough outline was described as one approach to measurement on waste, but FAO can bring the discussion to the Food Availability. The methodology for measuring waste is in the process of being developed by UN Environment. Once the methodology is defined the aggregation will be described.
DEFINITIONS
Definitions: Conceptual framework

• **Post-harvest operations** – is a generic concept that includes pre-harvest, harvest and post-harvest operations.
  – from farm to fork

• **Pre-harvest** constitutes the time frame between maturity and harvesting for crops. Pre-harvest losses have not been traditionally been included in the agricultural statistics definitions of production.

• **Harvest** refers to the act of separating the food material from the site of immediate growth or production. To address this would require crop-cutting surveys, reliable by-catch and pre-slaughter measurement.
Definitions: Food Losses

**FAO AGRICULTURAL STATISTICS**

- **Food losses** Crop and livestock product losses cover all quantity losses along the supply chain for all utilizations (food, feed, seed, industrial, other), up to the retail/consumption level. Losses of the commodity as a whole (including edible and non-edible parts) and losses, direct or indirect, that occur during storage, transportation and processing, also of relevant imported quantities, are therefore all included.

**2016 DEFINITIONAL FRAMEWORK**

- **Food loss and waste (FLW):** The decrease in quantity or quality of food.
- **Food losses** in the production to distribution segments of the FSC is mainly caused by the functioning of the food production and supply system or its institutional and legal framework.

Definitions differ for qualitative losses, non-edible parts, value chain boundaries – treatment of pre-harvest and harvest losses
Food losses Crop and livestock product losses cover all quantity losses along the supply chain for all utilizations (food, feed, seed, industrial, other), up to but not including the retail/consumption level. Losses of the commodity as a whole (including edible and non-edible parts) and losses, direct or indirect, that occur during storage, transportation and processing, also of relevant imported quantities, are therefore all included.

- quantities
- that leave the chain for any reason
- all supply stages
- non-food utilizations are NOT losses
- edible + inedible parts
Measured Definition of Food Losses

FAO AGRICULTURAL STATISTICS

• Food losses Crop and livestock product losses cover all quantity losses along the supply chain for all utilizations (food, feed, seed, industrial, other), up to but not including the retail/consumption level. Losses of the commodity as a whole (including edible and non-edible parts) and losses, direct or indirect, that occur during storage, transportation and processing, also of relevant imported quantities, are therefore all included.

N.B.

1. waste occurring on the supply side is measured under losses
2. Losses are tracked by commodity starting on the production site
3. Causes collected irrespective of intention and are sorted out later
Understanding data needs in the country

• Reduction of losses falls into several policy objectives:
  – Improving competitiveness and value-added of agricultural producers and value chain actors;
  – Increase the efficiency of supply chains through logistics, infrastructure, and equipment
  – Address risks that come from changes in the climate and economic conditions.
  – All while improving the welfare of the population, particularly those in extreme poverty or with severe food shortages.

• Which policy applied - affects the data needs
Understanding data needs – Further Focusing

• The political decision on priorities in food loss reduction might be influenced by:
  
  – Contribution to total food losses (in volume, in percentages)
  – Relevance of the food loss points (e.g. income, number of people involved, poverty and food insecurity, etc.)
  – Cost-effectiveness of a possible intervention (e.g. opportunities, cost of intervention, number of actors needed to be addressed, etc.)

• Loss data must be complemented with other information
GLOBAL & COUNTRY FOOD LOSS INDEX
FLI - Main principles and methodology

1. Focuses on 10 key commodities in 5 main groups
2. Measures Food Loss Percentages (FLP) and not on total losses
3. Monitors changes in the Food Loss Percentage over time
4. Based on nationally representative loss percentages along the supply chain
Indicator 12.3.1

- A Food Loss Percentage can be interpreted as the percentage of production that does not reach the retail stage.

Steps to compiling the Index if the data exists:
1. Select Basket of commodities and compile weights
2. Compile Food Loss Percentages
3. Compare Food Losses over time

Food Loss Index
Indicator 12.3.1 – Loss percentages

- Step 1: loss percentages of each commodity at country level
  - Percentage losses versus total losses
  - $l_{ijt}$ is the loss percentage (estimated or observed)
  - Where: $j =$ commodity, $i =$ country, $t =$ year
Indicator 12.3.1 - Countries’ Food Loss Percentages (FLI)

Step 2: Compile the **Food Loss Percentage (FLP)** of the whole basket of commodities at country level:

\[
FLP_{it} = \frac{\sum_j l_{ijt} * (q_0 * p_0)}{\sum_j (q_0 * p_0)}
\]

- The FLP is composed of several commodities
- The FLP is the average loss of these commodities
- Not all commodities have the same importance - weights
Indicator 12.3.1 - Countries’ Food Loss Index (FLI)

Step 3: Calculate the country Food Loss Index

\[ FLI_{it} = \frac{FLP_{it}}{FLP_{i0}} \times 100 \]

-Where:
  - \( i \) = country, \( t \) = year
  - \( t_0 \) is the base year (set at 2005 for the moment)
  - \( FLP_{it} \) is the country Food Loss Percentage

- The country FLI shows the change in the food loss percentage over time (compared to a base period)
Indicator 12.3.1 - Global Food Loss Index (GFLI)

Countries’ FLI must be aggregated for SDG monitoring by regions and for the world

\[ GFLI_t = \frac{\sum_{i=1}^{G} FLI_{it} \cdot w_i}{\sum_{i=1}^{G} w_i} \times 100 \]

• Where:
  – \( w_i \) are the country weights equal to the total agricultural value of production
Indicator 12.3.1 – Regional Food Loss Index (GFLI)

Country FLI must be aggregated for SDG monitoring by regions and for the world

\[ RFLI_t = \frac{\sum_{i=1}^{R} FLI_{it} \times w_i}{\sum_{i=1}^{R} w_i} \times 100 \]

- Where:
  - \( i \) = countries in region \( R \)
  - \( w_i \) are the country weights equal to the total agricultural value of production in the base year
Aims at national loss figures

Losses are estimated in each stage of each commodity’s supply chain. Different methods and tools can be used in the estimation.

Nationally Representative Loss percentages ($l_{ijt}$) by commodity

Weighted Aggregation by economic value of all commodities in the country basket => FLP

Food Loss Percentage$_{it}$ = \[ \frac{\sum_j l_{ijt} \cdot weights_{t=0}}{\sum_j (weights_{t=0})} \]
FLI - Underlying data: compiling the Food Loss Index

\[
\text{Food Loss Index (year } t \text{)} = \frac{\text{Food Loss Percentage}_i (\text{year } t)}{\text{Food Loss Percentage}_i (\text{Baseline year})} \times 100
\]
BUILDING THE INDEX
Hidden Challenges

- Choosing the Base Year
- Selecting the Basket of Commodities
- Compiling the Weights
- Collecting data and estimating losses at national level for each commodity across time
Choosing the base year

• We used the year 2005 for methodological development
• 2015 is the first year of SDG monitoring process
• Different baseline years
• Need to interpolate (model) loss percentages in the baseline year and in a common reporting year
Selecting the Basket of Commodities

- Setting a common basket of goods for global monitoring is a challenge:
  - the same commodities are not relevant for all countries
  - loss statistics cannot cover the entire basket
- Trade-off between relevance at country level and comparability across countries

<table>
<thead>
<tr>
<th>Comparability</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build the international basket under 5 headings, by selecting two commodities under each:</td>
<td>Countries determine the two commodities in each heading</td>
</tr>
<tr>
<td>1. Cereals &amp; Pulses;</td>
<td>Policy focus</td>
</tr>
<tr>
<td>2. Fruits And Vegetables;</td>
<td>Economic relevance</td>
</tr>
<tr>
<td>3. Roots, Tubers &amp; Oil-Bearing Crops;</td>
<td>Food security relevance</td>
</tr>
<tr>
<td>4. Animals products;</td>
<td></td>
</tr>
<tr>
<td>5. Fish and fish products</td>
<td></td>
</tr>
<tr>
<td>6. Other crops (stimulants, spices, sugar, etc.)</td>
<td></td>
</tr>
</tbody>
</table>
Default Basket relevance

- The default process is to:
  - Compile value of production for every commodity (in the base year)
  - Group commodities by category and rank them
  - Select the top 2

- Countries can go beyond the top 10 or revise the basket
- Similar commodities (walnuts and pistachios; goats and sheep; etc.) will likely be similar in perishability, but economic factors may trigger differences loss
Selecting the Basket of Commodities

• How to ensure relevance? Priority commodities are set by the countries
  – Categories correspond to the basic food groups and dietary needs, so every
country should have at least one priority commodity in each category.

• Will the basket be representative?
  – Loss levels of the products within categories should also broadly similar while
  average loss levels across categories will be systematically different.

• How to keep a minimum comparability?
  – The main groups are the same for all countries
  – Some direct comparisons within the baskets can come from regions where
    there is more commonality in diets
Choices of Weights

Economic value – emphasis on losses that are market driven, bias towards higher valued commodities, commodity groupings adjust against bias; also useful for ascertaining benefits-costs of policy

Other Weights can be applied in parallel to show impact of changing losses on policies

- Contribution to diets (caloric or protein value) - bias towards meats and staples, no emphasis on fruits and vegetables which might need more resources to grow & transport, higher energy consumption
- Environmental factors (water or C02) – Bias against meats and fruits and vegetables and nuts, as well as production systems by country
Challenge: measuring the loss percentage $l_{ijt}$

- Most critical is $l_{ijt}$ nor is it trivial to obtain the data
Challenge: measuring the loss percentage $l_{ijt}$

- Measuring $l_{ijt}$ is at the core of the matter. There are several available tools:
  - Preliminary assessments to identify the critical loss points
  - Full-sample surveys to construct national loss estimates by crops
  - Modelling to improve the quality of the estimates
  - Experimental designs
  - Qualitative approaches (e.g. focus groups) to better understand dynamics under post-harvest management practices
  - Covering the supply chain = several surveys!

The full range of instruments is needed to address this challenge
Aggregating losses along the supply chain

• Different stages have different starting quantities, and therefore percentages cannot be summed across the entire chain.
• This is one of the most common mistakes that contributes to overestimating losses has been in aggregating estimates along the supply chain.
Using \( \hat{L} \) in the Supply Chain

<table>
<thead>
<tr>
<th>Starting Amount</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Losses (%)</td>
<td>Farm 7.3</td>
</tr>
<tr>
<td>Amount Lost</td>
<td>73</td>
</tr>
<tr>
<td>Amount Remaining</td>
<td>927</td>
</tr>
</tbody>
</table>

| % of original still in the market | 81.3% (813.289/1000) *100 |
| % lost from farm to (but not including) retail | 18.7% (1-0.813)*100 |
Food Loss Index: based on loss percentages by commodity

- Percentage losses versus total losses
- Loss percentages can be observed or survey-based (guidelines for data collection) or estimated (model-based)
  - $l_{ijt}$ is the loss percentage
    (Where: $j =$ commodity, $i =$ country, $t =$ year)

FBS example.
Losses are estimated by the country using a constant factor of 15%. Production and losses in tons fluctuate.
A two-pronged approach to data collection

assist countries in collecting food loss data

assist countries in estimating losses

FAOSTAT and Food Loss and Waste database
What data collection tools to obtain the Food Loss Percentage?

Focus on on-farm measurement
THANK YOU!
QUESTIONS?