



Food and Agriculture Organization
of the United Nations

FAO Workshop on: Monitoring SDG 12.3.1 Global Food Loss Index

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**Introduction and warm-up
Global Food Loss Index (GFLI)**

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Learning Objectives

- Understand the SDG target 12.3 and indicator 12.3.1
- 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

Governance and Institutional architecture

“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”

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

“By 2030, ...



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



“...reduce **food losses** along **production and supply chains**, including post-harvest losses.”

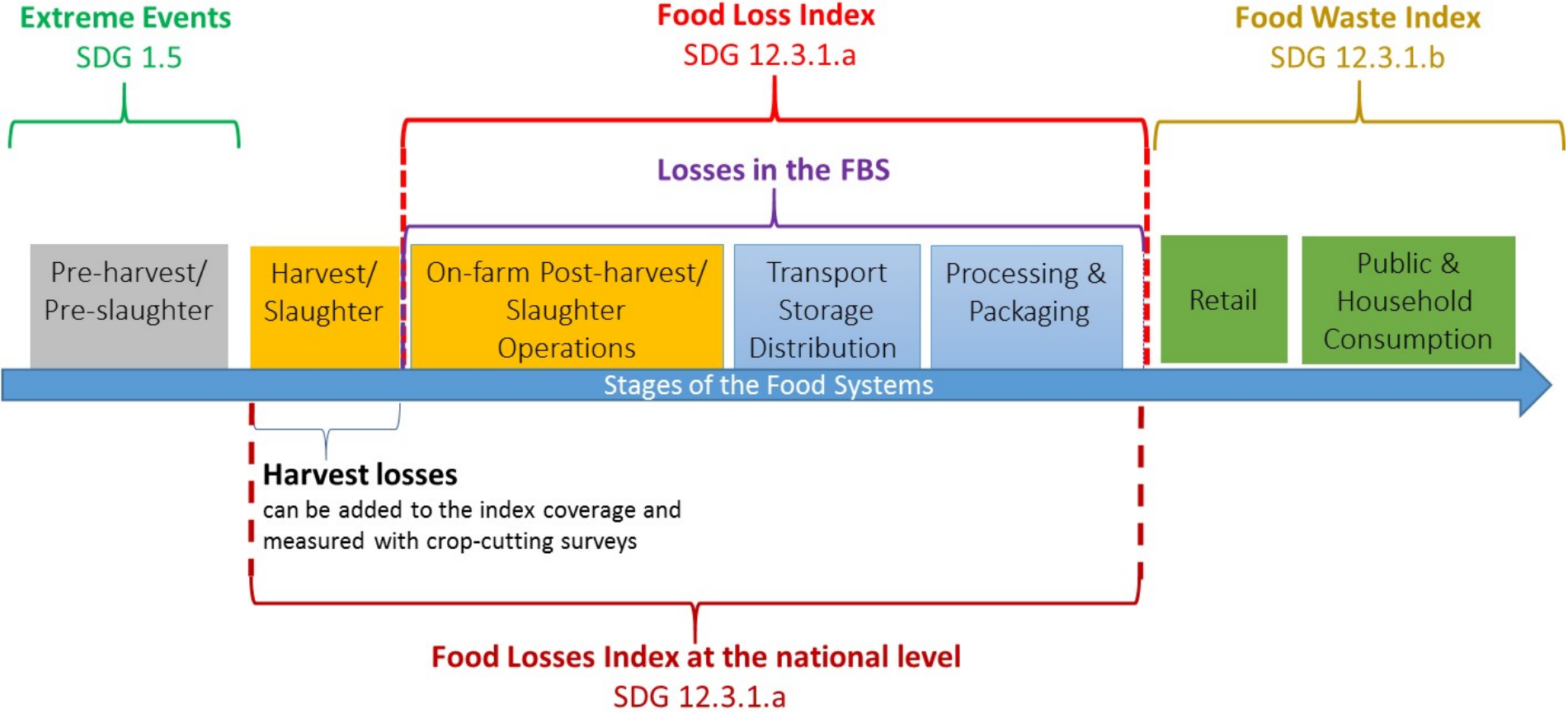


“...halve per capita global **food waste** at the **retail and consumer levels**.”

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





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 be 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.

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.

- 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

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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

- 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

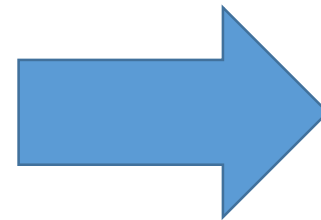
1. Focuses on 10 key commodities in 5 main groups
2. Measures Food Loss Percentages (FLP) and not on total losses
3. Monitors changes in the Food Loss Percentage over time
4. Based on nationally representative loss percentages along the supply chain

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:

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

← Economic weights

- 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**

$$FLI_{it} = \frac{FLP_{it}}{FLP_{it_0}} * 100$$

- 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

$$GFLI_t = \frac{\sum_{i=1}^G FLI_{it} * w_i}{\sum_{i=1}^G w_i} * 100$$

- Where:
 - w_i are the country weights equal to the **total agricultural value of production**

Indicator 12.3.1 – Regional Food Loss Index (GFLI)

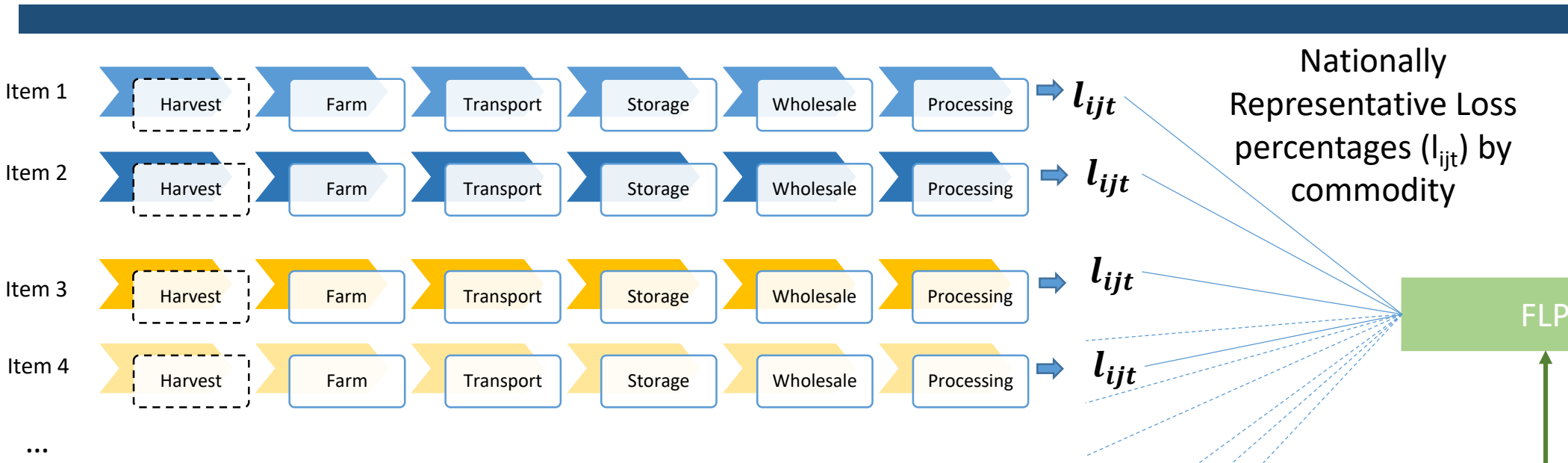
Country FLI must be aggregated for SDG monitoring by regions and for the world

$$RFLI_t = \frac{\sum_{i=1}^R FLI_{it} * w_i}{\sum_{i=1}^R w_i} * 100$$

- 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

Percentage losses versus total losses reduce the noise of bumper/short crop dynamics



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

FLP

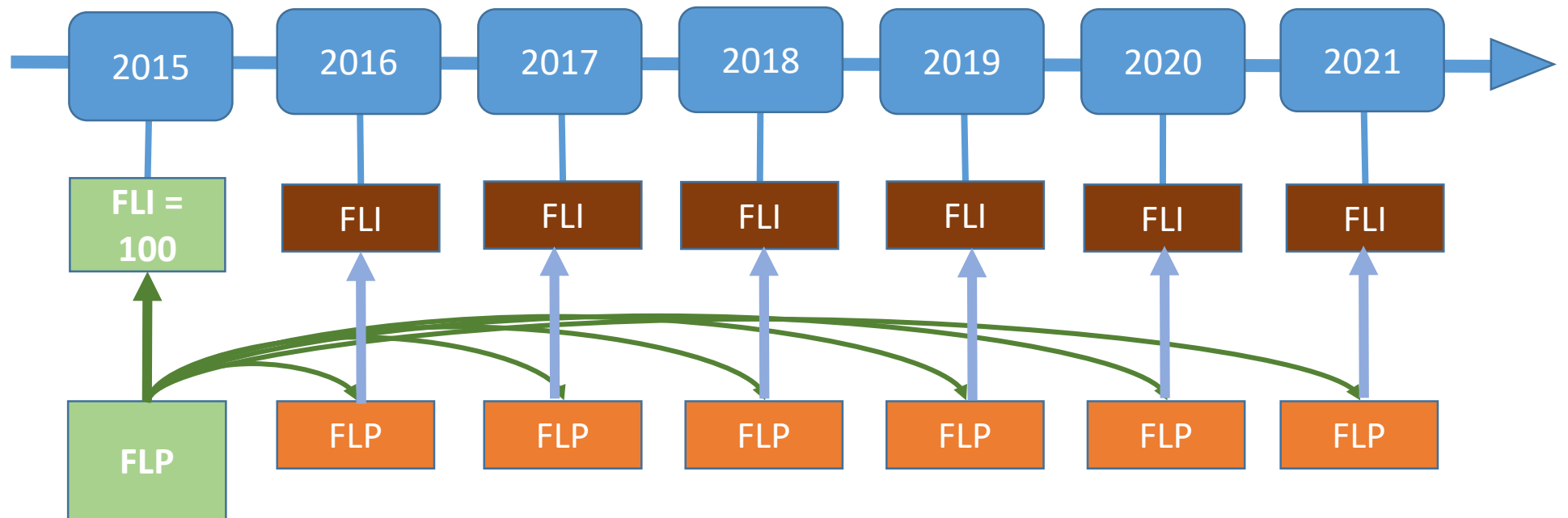
Losses are estimated in each stage of each commodity's supply chain.
Different methods and tools can be used in the estimation

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

$$Food\ Loss\ Percentage_{it} = \frac{\sum_j l_{ijt} * weights_{t=0}}{\sum_j (weights_{t=0})}$$

FLI - Underlying data: compiling the Food Loss Index

$$\text{Food Loss Index (year } t) = \frac{\text{Food Loss Percentage}_i(\text{year } t)}{\text{Food Loss Percentage}_i(\text{Baseline year})} * 100$$



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

Comparability

Build the international basket under 5 headings, by selecting two commodities under each:

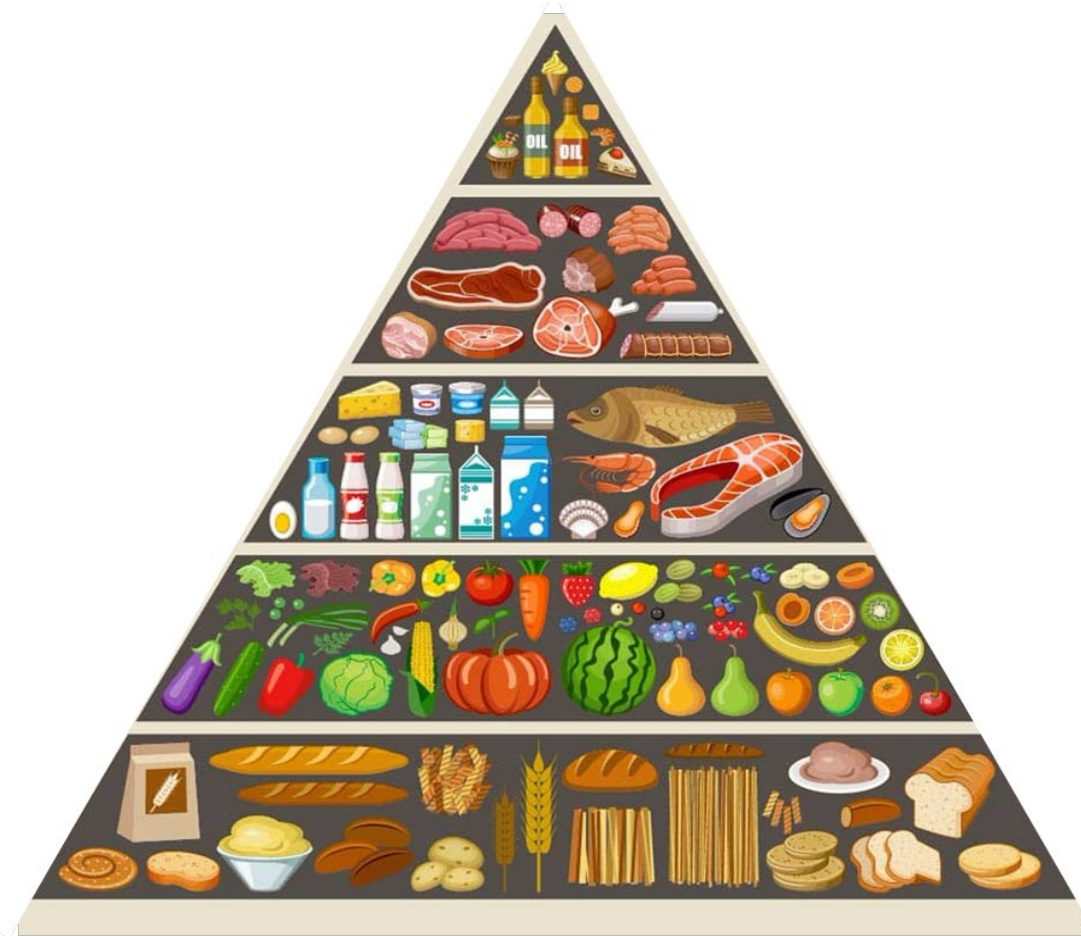
1. Cereals & Pulses;
2. Fruits And Vegetables;
3. Roots, Tubers & Oil-Bearing Crops;
4. Animals products;
5. Fish and fish products
6. Other crops (stimulants, spices, sugar, etc.)

Relevance

Countries determine the two commodities in each heading

Policy focus
Economic relevance
Food security relevance

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

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 CO₂) – 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



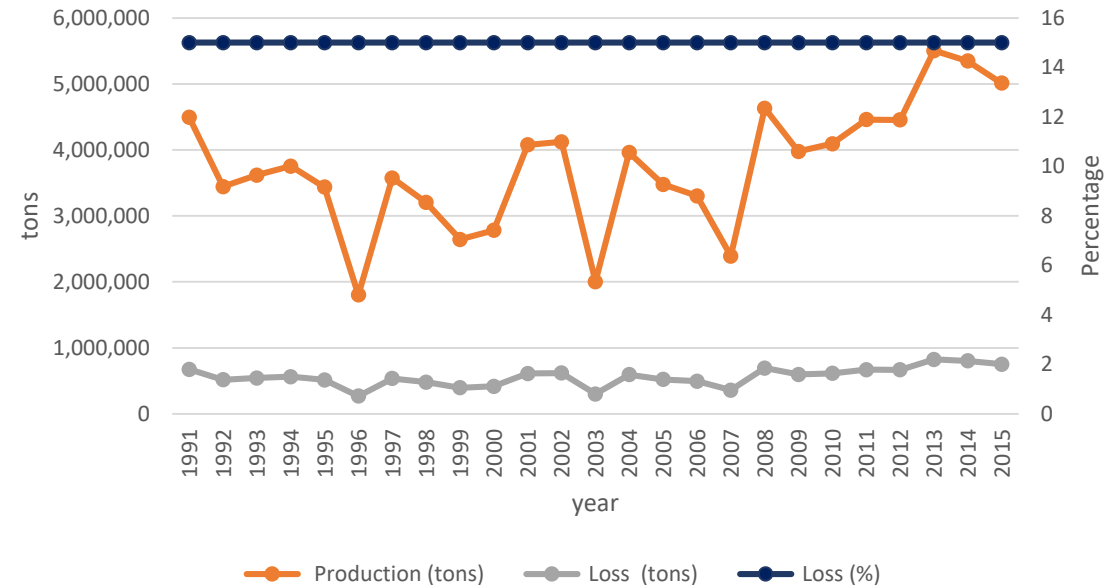
Challenge: measuring the loss percentage l_{ijt}

- 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
 - Experimental designs
 - Qualitative approaches (e.g. focus groups) to better understand dynamics under post-harvest management practices
 - Modelling to improve the quality of the estimates

The full range of instruments is needed to address this challenge

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.

How to calculate the Food Loss Index?

Country FLI Example

[Excel](#)



Questions?