Food Balance Sheets

FBS component: Production
Learning Objectives

At the end of this session, the audience will know:

• The *agricultural production domain*

• Different *data sources* for production

• Main recommended *imputation and estimation methodologies* where a data source cannot be found
Outline

1. Agricultural production domain
2. Production data sources
3. Imputation and estimation
Introduction

- Data for production should include:
  - all production quantities of a given commodity within the country
  - both commercial and non-commercial production

- Production of primary products:
  - reported at the farm gate level (so it does not include harvest losses)
    - It should include: any post-harvest on-farm loss occurring during the different farm operations, such as threshing, cleaning/winnowing or storage

- Data for meat production:
  - both commercial and farm slaughter
  - production should be expressed in terms of carcass weight
Introduction

• Production of derived or processed commodities:
  - refers to the total output of the product after transformation
  - may occur either at the household or at a commercial establishment

• The standard unit for the reporting of agricultural production is metric tonnes (MT)
  - But many countries also use local units
Introduction

• Data on agricultural production is one of the foundations of the food balance sheet framework.

• Countries not currently collecting agricultural production data should consider first investing their resources in generating reliable data on production.

• Even countries with highly-developed official survey methodologies may not collect production data on all commodities.

• So, some suggestions on alternative data sources and imputation strategies are needed.
1. Agricultural production domain

CROPS

- CEREALS
- ROOTS AND TUBERS
- SUGAR CROPS
- PULSES
- NUTS
- OIL CROPS
- VEGETABLES
- FRUIT
- STIMULANTS
- SPICES
- FORAGE PRODUCTS
- TOBACCO
- NATURAL RUBBER
- FIBERS, VEGETAL OR ANIMAL ORIGIN

CROPS PROCESSED

- SUGAR, RAW, CENTRIFUGAL
- VEGETABLE OILS
- CAKES
- FRUIT PREPARATION
- ALCOHOLIC BEVERAGES
1. Agricultural production domain

LIVESTOCK AND PRODUCTS

Livestock – Live Animals

Product from Slaughtered Animals

Products from Live Animals
1. Agricultural production domain

• FAO Commodity Groups:

• FAOSTAT
2. Production data sources

Official data sources

• The **preferred source** of data on agricultural production is **survey-based official data**.

• It is highly recommended that countries:

  - conduct annual production surveys for **major commodities**;
  - endeavour to measure **all commodities** in less frequent agricultural censuses or structural surveys;
2. Production data sources

Official data sources

• Official sources should collect not only information on production output, but also on activity and productivity variables for two main reasons:
  ¬ they are useful for validating production data;
  ¬ assist in imputation of missing data in future years or years where surveys do not take place.

• Outside of surveys, administrative data may be another potential data source for certain products.

• Data from industrial output surveys may also be useful sources for the production of derived products, such as flour or beer.
2. Production data sources

Official data sources

• The **Global Strategy** has produced several publications to improve production data for both crops and livestock:

  - For Guidelines on how to collect data on agriculture by including production modules in other household surveys, see, FAO (2015a).
  - For information on estimation of crop production, see Sud et al. (2016).
  - For further information on estimation of livestock production, see Moss et al. (2016).
2. Production data sources

Official data sources

Global Strategy publications


2. Production data sources

**Alternative data sources**

- FBS compilers can consult two additional potential data sources in their search for production data:
  - records of private firms: where production is delivered to a handful of firms.
  - commodity organizations: if their members represent nearly all production. Some of these commodity organizations are international.
2. Production data sources

**FAO production data sources**

- Country Questionnaires
- CountryStat
- Country Yearbooks
- Country websites
- International Organisation (Eurostat, Afristat, AEOD)
- International Publications (Licht, Oilworld, OIV)
- Other FAO Divisions & UN Statistics Divisions
- Other sources (Reuter, USDA, meetings)
2. Production data sources

Production Questionnaire

Questionnaire on Crop and Livestock Production and Utilization

Excel Version

National Reporting Office and Contact name

10 Reporter name:
11 Title: Statistics Netherlands
12 Administration and Office: see Sect5 Metadata
13 Address: www.cbs.nl
14 Web site address: www.cbs.nl
15 Signature: 
16 Tel: Fax: E-mail: Date:

This questionnaire contains the following sections:

Section 1: Primary Crop Production
Section 2: Selected Primary Crops Utilization
Section 3: Livestock (Animal Numbers and Livestock Production)
Section 4: Selected Derived Agricultural Commodities
Section 5: Crop and Livestock Metadata
### Section 1: PRIMARY CROP PRODUCTION

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<td>15</td>
<td>00190</td>
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<td>14164</td>
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**Notes:**
If a different unit is exclusively used to that specified, please indicate the unit used, as well as any other relevant notes specific to a given commodity data, in this column (e.g. provisional data, revised data, reason of high variation, changes in methods, etc.).
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<th>Code</th>
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<th>2011 Production (MT)</th>
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<td></td>
<td>(Crude or Crudo equivalent)</td>
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<tr>
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<td>21535*</td>
<td>Oil of Groundnuts</td>
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<td></td>
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<tr>
<td>258</td>
<td>21537*</td>
<td>Oil of Palm kernel</td>
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<td>Vegetable Oils</td>
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<td>245</td>
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<td>Cake of Groundnuts</td>
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<tr>
<td>259</td>
<td>21710*</td>
<td>Cake of Palm kernel</td>
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<td>Production (MT)</td>
<td>Milking Animals (No)</td>
<td>Production (MT)</td>
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</table>
3. Imputation and estimation

The recommended imputation depends somewhat on the commodity for which production is to be estimated. Different approaches to imputation recommended for:

- crops,
- processed products derived from crops,
- and livestock-derived products.
3. Imputation and estimation

Crops

• When estimating production of crops, imputation is based upon the following identity:

\[ \text{Production (MT)} = \text{Yield} \left( \frac{MT}{HA} \right) \times \text{Harvested Area (HA)} \]  

(2.1)

• In the agricultural survey program of many countries, data is collected on sown area, but not on harvested area.

• While data on harvested area is preferred, sown area estimates can also be adapted and used for this purpose.
3. Imputation and estimation

Crops

• Calculating any of the three unknowns (production, yield, or area) requires only an estimate of the other two terms.

• So for production, the recommended imputation approach is a three-step procedure:
  - **Step 1**: Measure, impute, or approximate a yield estimate.
  - **Step 2**: Measure, impute, or approximate an estimate of harvested area.
  - **Step 3**: Multiply yield and harvested area estimates together to arrive at a production estimate.
3. Imputation and estimation

Crops

Step 1: Measure, impute, or approximate a yield estimate.

• Understand the nature of yields for the crop being modeled graphing of historical yields and some general research into the typical characteristics for yields.

• The graphing of historical yield data should be followed by an analysis to determine which functional form best fits the data.

• Include other relevant explanatory variables in the estimating regressions.
3. Imputation and estimation

Crops

Step 2: Harvested Area.

- Calculate a harvested area based on the estimate of sown area, and some estimate of the percentage of land that was abandoned (abd)

\[ Harvested\ area_t = (1 - abd)Sown\ area_t \]  \hspace{1cm} (2.2)

- Estimating some percentage of abandoned area, countries may have some information as to the actual area of land abandoned

\[ Harvested\ area_t = Sown\ area_t - Abandoned\ area_t \] \hspace{1cm} (2.3)

- Use sown area to proxy for harvested area if an abandonment rate or a quantity of abandoned area is unknown
3. Imputation and estimation

Crops

Step 3: Derive production estimate by multiplying estimates for harvested area and yield.

• With estimates of both harvested area and yield in hand, FBS compilers need only multiply the two together using equation (2.1).

• In this case, the quality flag assigned to the production estimate should reflect the quality of the yield and harvested area used.
3. Imputation and estimation

Processed products derived from crops

• Only two pieces of information necessary for imputing values for derived goods:
  
  - The amount of the primary good that is being processed (that is, quantities of primary goods assigned to the *food processing* variable).
  
  - The extraction rate (For most products, extraction rates will fluctuate very little over time).

• Estimating the *quantity* of a given primary commodity destined for processing can be a bit more complicated.
3. Imputation and estimation

Processed products derived from crops

Example: Mustard seed processed products
3. Imputation and estimation

**Processed products derived from crops**

Example: Mustard seed processed products

Processing shares for oil of mustard seed and cake of mustard seed will both be 80%, since the two are outputs of a single transformation process (co-production)

<table>
<thead>
<tr>
<th></th>
<th>Mustard seed</th>
<th>Oil of mustard</th>
<th>Cake of mustard seed</th>
<th>Flour of mustard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Amount Processed</td>
<td>400,000</td>
<td>320,000</td>
<td>320,000</td>
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<tr>
<td>B</td>
<td>Processing Share</td>
<td>80%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Amount of Input</td>
<td>320,000</td>
<td>320,000</td>
<td>80,000</td>
</tr>
<tr>
<td>D</td>
<td>Extraction Rate</td>
<td>36%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Production of derived goods</td>
<td>115,200</td>
<td>192,000</td>
<td>56,000</td>
</tr>
</tbody>
</table>
3. Imputation and estimation

Livestock and livestock product imputation

- Using this estimate of animals slaughtered, and applying the appropriate yield conversion factor for the product in question below:

\[ Production (MT) = Yield \left( \frac{MT}{Animal} \right) \times Animals Slaughtered \quad (2.4) \]

- If the number of animals slaughtered is not known, but production of at least one derived product is known, then FBS compilers should start from that number and work backwards to first derive an estimate of the number of animals slaughtered.

\[ Animals Slaughtered = \frac{Production (MT)}{Carcass Yield \left( \frac{MT}{Animal} \right)} \quad (2.5) \]

- FBS compilers are advised to combine official data with an estimate of non-registered animals or production of livestock-derived goods outside of official channels.
References

- Global Strategy to improve agricultural and rural statistics, 2017. *Handbook of Food Balance Sheet*, Rome, Italy, chapter 3.5, section 3.5.1

- *Technical Conversion Factors (TFC) for Agricultural Commodities*
Thank You