Food Balance Sheets

## Palm Oil

The step-by-step introductions of the wheat and sugar example provided ample opportunities to demonstrate various specificities and intricacies in compiling SUA and FBS tables. While it would be impossible to anticipate all possible challenges for FBS compilers at country level, it was deemed useful to expose and address a number of additional challenges by presenting the compilation of another product. Palm oil offers the possibility to broaden and deepen the experience gained so far and add new challenges. The basic strategy in building up the SUA and FBS tables follows the same principals steps as for wheat and sugar. We therefore start off again with an empty table ():

Table 1: Initial SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | - | - | - | - | - | - | - | - | - | - | - |
| Palm oil | - | - | - | - | - | - | - | - | - | - | - |
| Oil of palm kernels | - | - | - | - | - | - | - | - | - | - | - |
| Margarine and Shortening | - | - | - | - | - | - | - | - | - | - | - |
| Fatty acids | - | - | - | - | - | - | - | - | - | - | - |
| Oil boiled, dehydrated | - | - | - | - | - | - | - | - | - | - | - |
| Fat preparations nes | - | - | - | - | - | - | - | - | - | - | - |
| Hydrogenated oils | - | - | - | - | - | - | - | - | - | - | - |

### Production

For production data, we first fill in the table with any available official figures. In this case, we assume that the production quantity is known for all the primary products and thus no imputation is done. We also have production data available for two of the processed commodities: margarine and fat preparations ().

Table 2: Adding production data to the SUA table for palm oil and products

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | **0** | - | - | - | - | - | - | - | - | - | - |
| Palm oil | **0** | - | - | - | - | - | - | - | - | - | - |
| Oil of palm kernels | **-** | - | - | - | - | - | - | - | - | - | - |
| Margarine and Shortening | **3,714,000** | - | - | - | - | - | - | - | - | - | - |
| Fatty acids | **-** | - | - | - | - | - | - | - | - | - | - |
| Oil boiled, dehydrated | **-** | - | - | - | - | - | - | - | - | - | - |
| Fat preparations nes | **194,100** | - | - | - | - | - | - | - | - | - | - |
| Hydrogenated oils | **-** | - | - | - | - | - | - | - | - | - | - |

### Trade

The relevant steps for collecting and compiling trade data are presented in Chapter 2 and have been laid out in detail for the wheat example. For this example, we simply insert the available trade figures ().

Table 3: Adding trade estimates to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | **0** | **0** | - | - | - | - | - | - | - | - |
| Palm oil | 0 | **1,087,600** | **94,900** | - | - | - | - | - | - | - | - |
| Oil of palm kernels | - | **0** | **0** | - | - | - | - | - | - | - | - |
| Margarine and Shortening | 3,714,000 | **0** | **0** | - | - | - | - | - | - | - | - |
| Fatty acids | - | **0** | **0** | - | - | - | - | - | - | - | - |
| Oil boiled, dehydrated | - | **0** | **0** | - | - | - | - | - | - | - | - |
| Fat preparations nes | 194,100 | **0** | **0** | - | - | - | - | - | - | - | - |
| Hydrogenated oils | - | **0** | **0** | - | - | - | - | - | - | - | - |

### Stock Changes

Generally, stocks will be held for a select number of primary level products (such as wheat or rice). Similar to sugar, margarine is another exception to the rule: a processed product for which stocks are occasionally held ().

Table 4: Adding stock changes to the SUA table for stock changes

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | **0** | - | - | - | - | - | - | - |
| Palm oil | 0 | 1,087,600 | 94,900 | **0** | - | - | - | - | - | - | - |
| Oil of palm kernels | - | 0 | 0 | **0** | - | - | - | - | - | - | - |
| Margarine and Shortening | 3,714,000 | 0 | 0 | **3,900** | - | - | - | - | - | - | - |
| Fatty acids | - | 0 | 0 | **0** | - | - | - | - | - | - | - |
| Oil boiled, dehydrated | - | 0 | 0 | **0** | - | - | - | - | - | - | - |
| Fat preparations nes | 194,100 | 0 | 0 | **0** | - | - | - | - | - | - | - |
| Hydrogenated oils | - | 0 | 0 | **0** | - | - | - | - | - | - | - |

### Food

The module estimating food allocation uses food consumption estimates from the previous year and extrapolates these estimates forward using changes in GDP and product-related income elasticities. Recall that the "Food" variable is generally only reported at the primary level as the "Food Processing" variable is estimated by standardizing the "Food" quantities for all the processed commodities. However, in some cases (such as this example), there may be no availability of the primary product and a large import value in a processed product. In this case, it makes sense to instead standardize food and food processing to this level, as this is likely where the processed product is being created.

For our example, suppose that our food module estimated a consumption of 3.7 million tons of margarine. We would then standardize this estimate back to the food processing element for oil of palm fruit for our balancing. However, margarine is a product that can be created from many different commodities, and thus we must standardize this food amount back into all the possible commodities that can be processed to create margarine. For example, suppose we have the following commodities () that can be used to create margarine (and no other commodities in this country that could be processed into margarine):

Table 5: Primary products (oilseeds and crops) used to produce margarine

|  |  |  |  |
| --- | --- | --- | --- |
| Commodity | Availability | Equivalent Availability for Margarine | Share |
| Oil Palm Fruit | 0 | 0 | 0% |
| Palm oil | 993,000 | 1,122,100 | 30.1% |
| Soyabeans | 3,874,100 | 788,000 | 21.1% |
| Sunflower Seed | 3,930,500 | 1,821,000 | 48.8% |

The equivalent availability for margarine is derived from the availability of the primary commodity by multiplying by the extraction rate(s) to convert the primary commodity into margarine. Then, the share is computed by comparing availability: 30.1% of the total availability of margarine comes from palm oil, so we assume that 30.1% of the margarine is produced from palm oil. This is, of course, just an approximation, and in the absence of country specific information it is a reasonable assumption. Thus, the 3.7 million tonne requirement of margarine production must have 30.1% satisfied by palm oil, or 1.1 million tonnes. This translates into 980 thousand tonnes of palm oil (dividing by extraction rates). Suppose there is also some small consumption reported for fat preparations, and so the final food processing estimate for oil palm fruit is about 1.2 million tonnes ().

Table 6: Adding food processing to the SUA table of palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | **0** | **-** | - | - | - | - | - |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | **0** | **1,159,700** | - | - | - | - | - |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Margarine and Shortening | 3,714,000 | 0 | 0 | 3,900 | - | - | - | - | - | - | - |
| Fatty acids | - | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | - | - | - | - | - |

To avoid later confusion, we also adjust the production value of margarine and shortening (as only 37.5% of this production will be covered by oil palm fruit). provides the updated information, inclusive of production estimates for margarine and shortening.

Table 7: Adding production of processed products to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | - | - | - | - | - |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Margarine and Shortening | **1,117,000** | 0 | 0 | 3,900 | - | - | - | - | - | - | - |
| Fatty acids | - | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | - | - | - | - | - |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | - | - | - | - | - |

### Food Losses and Waste (FLW)

FLW is estimated using the methodology described in Chapter 2, unless losses quantities are measured by the country. For palm oil, FLW that occur during processing of palm oil are taken into account in the standardization procedure. Those for oil palm fruit are likely to be greater than zero, but only if a country produces palm fruit. That is not the case for the country under consideration and therefore FLW estimates can, and in fact should be, assumed to be zero (). If a country produces palm fruit, FLW would need to be imputed or, preferably, measured with appropriate methods and reported in representative surveys.

Table 8: Adding Food losses and Waste to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | **0** |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | - | - | - | - | **0** |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | - | - | - | - | - | **0** |
| Fatty acids | - | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | - | - | - | - | **0** |

### Seed

As the country of interest has no production of palm oil fruit, no amount will be allocated to seed. But even if the country produced palm fruit, that amount would be zero as propagation takes places through planting of new trees. Thus, we can fill the table in with zeros (Table 9).

Table 9: Adding seed use to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | - | **0** | - | - | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | - | **0** | - | - | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | - | **0** | - | - | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | - | - | **0** | - | - | 0 |
| Fatty acids | - | 0 | 0 | 0 | - | - | - | **0** | - | - | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | - | **0** | - | - | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | - | **0** | - | - | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | - | **0** | - | - | 0 |

### Industrial Utilization

Industrial utilization can account for a major share of palm oil use and in fact palm oil has become an increasingly important feedstock for many non-food industries. Apart from the use for biodiesel and a replacement or additive to heating fuel (e.g. in district heating systems), palm oil is an increasingly popular raw material for the production of soaps, detergents, paints and even cosmetics. As already outline in the wheat and sugar examples, the amounts of raw materials used for industrial purposes are difficult to gauge and thus to impute; what is more, the amounts are likely to change rapidly with policy incentives and energy prices, both factors are difficult to predict. In short, to estimate the amounts of palm oil used, there is no real alternative to data collection. For the sake of simplicity, it was therefore assumed to be zero ().

Table 10: Adding industrial use to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | - | 0 | - | **0** | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | - | 0 | - | **-** | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | - | 0 | - | **-** | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | - | - | 0 | - | **-** | 0 |
| Fatty acids | - | 0 | 0 | 0 | - | - | - | 0 | - | **-** | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | - | 0 | - | **-** | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | - | 0 | - | **-** | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | - | 0 | - | **-** | 0 |

### Tourist Consumption

For this particular example, suppose we have a small number of tourists leaving or coming to this country, and so the allocation of the commodity to the tourist element is roughly zero ().

Table 11: Adding tourist consumption to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | - | 0 | **0** | 0 | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | - | 0 | **0** | - | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | - | 0 | **0** | - | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | - | - | 0 | **0** | - | 0 |
| Fatty acids | - | 0 | 0 | 0 | - | - | - | 0 | **0** | - | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | - | 0 | **0** | - | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | - | 0 | **0** | - | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | - | 0 | **0** | - | 0 |

### Feed

For the palm oil commodity tree, only one element is allocated to feed (cakes of palm kernels). This commodity is a by-product in the processing of palm kernels into oil of palm kernels. However, for the example we are considering, no palm kernels are available. Thus, neither "oil of palm kernels" nor "cake of palm kernels" are produced. Also, palm oil itself is never fed directly to animals, and thus we have no commodity to allocate any feed to. Thus, all feed is assumed to be 0 ().

Table 12: Adding feed use to the SUA table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | **0** | 0 | 0 | 0 | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | **0** | 0 | 0 | - | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | **0** | 0 | 0 | - | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | - | **0** | 0 | 0 | - | 0 |
| Fatty acids | - | 0 | 0 | 0 | - | - | **0** | 0 | 0 | - | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | **0** | 0 | 0 | - | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | **0** | 0 | 0 | - | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | **0** | 0 | 0 | - | 0 |

### Standardization and Balancing

As for all commodities, producing the detailed entries into the SUA table is just the first important steps towards a balanced, aggregated and standardized FBS template. The next important steps are to first aggregate/standardize the SUA tables and then to completely balance supply and utilization. These steps are laid out in the following section. To start and understand the standardization process, it is important to recall the processing structure. To this end, we assume the following commodity tree structure ():

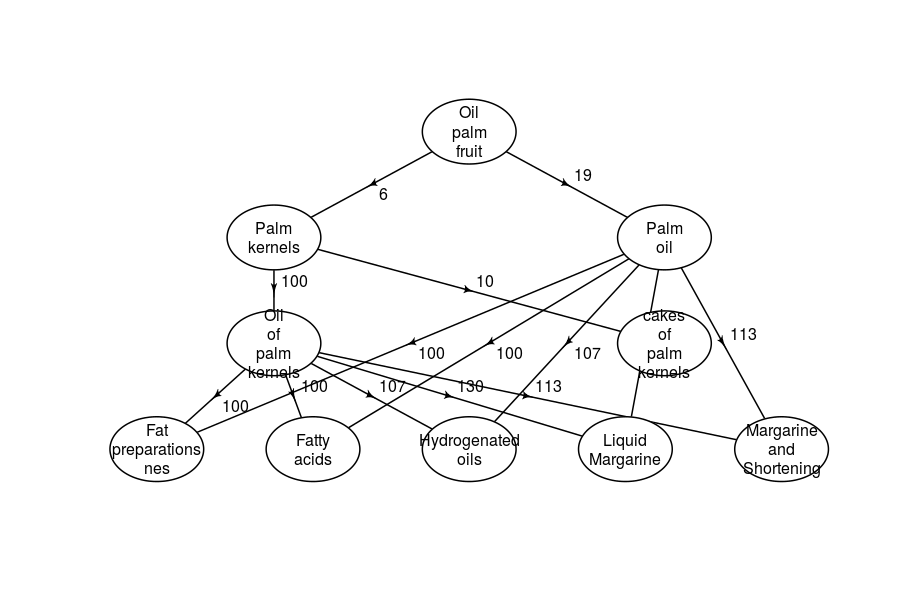


Figure 1: Commodity tree for palm oil

In a first step we recall the complete SUA table produced so far (). It is the basis for the standardization process and indeed must contain all estimates for all input variables of this process.

Table 13: Initial SUA table, with all inputs to the standardization process

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,159,700 | 0 | 0 | 0 | - | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | - | - | 0 | 0 | 0 | - | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | - | 0 | 0 | 0 | - | 0 |
| Fatty acids | - | 0 | 0 | 0 | - | - | 0 | 0 | 0 | - | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | - | 0 | 0 | 0 | - | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | - | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | - | - | 0 | 0 | 0 | - | 0 |

The next step in this process is to balance the processed commodities by creating production quantities. However, in our case, we have official production figures for the two main uses of oil palm fruit within this country: margarine and fat preparations. Since these figures are official and compose the majority of the end uses of oil palm fruit, we should update the food processing estimate based on these official figures ():

Table 14: Updating the SUA table with food processing information

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | **1,182,600** | 0 | 0 | 0 | - | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | - | 0 | 0 | 0 | 0 | - | 0 |
| Fatty acids | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 |

Some of the SUA lines are not balanced, and this is because we have not allocated utilizations in the case of excess supply. For these commodities, we should allocate the excess trade amount according to the variable which makes the most sense for that particular commodity (or, multiple variables if we know the split at which a commodity is utilized). These operations are reflected in .

Table 15: Removing remaining imbalances in the SUA table

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Oil palm fruit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Palm oil | 0 | 1,087,600 | 94,900 | 0 | 0 | 1,182,600 | 0 | 0 | 0 | 0 | 0 |
| Oil of palm kernels | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Margarine and Shortening | 1,117,000 | 0 | 0 | 3,900 | **1,113,100** | 0 | 0 | 0 | 0 | 0 | 0 |
| Fatty acids | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oil boiled, dehydrated | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fat preparations nes | 194,100 | 0 | 0 | 0 | **194,100** | 0 | 0 | 0 | 0 | 0 | 0 |
| Hydrogenated oils | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The next step is to aggregate this full table back into the primary commodity equivalent (in this case palm oil). We follow the same aggregation/standardization process as outlined in the wheat example and obtain the complete balance for palm oil in primary equivalents ().

Table 16: Aggregated FBS balance for palm oil

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Feed | Seed | Tourist | Industrial | Loss |
| Palm oil | 0 | 1,087,600 | 94,900 | 3,400 | 1,179,200 | 0 | 0 | 0 | 0 | 0 |

Now, we must balance to satisfy the FBS equation of supply equals utilization. To do this, we need to extract the computed standard deviations of each variable (). These standard deviations are determined by the data source (i.e. for official data, a standard deviation of 0 is applied. For semi-official data, a higher standard deviation is used; and for estimated quantities an even larger standard deviation is used). In this case, production and trade quantities are official while all other quantities are estimated.

Table 17: FBS balances inclusive of measurement errors

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Production | Imports | Exports | Stock Change | Food | Feed | Seed | Tourist | Industrial | Loss |
| Mean | 0 | 1,087,600 | 94,900 | 3,400 | 1,179,200 | 0 | 0 | 0 | 0 | 0 |
| Standard Dev. | 0 | 0 | 0 | 1,400 | 59,000 | 0 | 0 | 0 | 0 | 0 |

After balancing the above tables, we have with the following quantities (). Note that the "Food" variable is the variable that receives most of the adjustment because it has a substantially higher variability.

Table 18: Fully balanced FBS table for palm oil

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Production | Imports | Exports | Stock Change | Food | Feed | Seed | Tourist | Industrial | Loss |
| Mean | 0 | 1,087,600 | 94,900 | 3,300 | 989,400 | 0 | 0 | 0 | 0 | 0 |
| Standard Dev. | 0 | 0 | 0 | 1,400 | 59,000 | 0 | 0 | 0 | 0 | 0 |

After balancing, some quantities are updated (and some remain unchanged, if they have a standard deviation of zero). As with the wheat example, the aggregated table can be placed directly into the food balance sheet. Note that if we also had any data on oil of palm kernels, we would need to also perform a standardization and balance for that commodity and include that as a separate FBS line.

As with the other two examples, we now calculate the calorie, fat, and protein content using the food consumption values at the SUA level (). We do this by applying the calorie/fat/protein content factors to all SUA items with a non-zero food quantity. Also, note that our food quantity for the standardized commodity was adjusted down. In order to ensure consistency, we must adjust all our SUA food quantities by the same percentage. As with the wheat example, note that a GJ is a measure of energy equal to a billion joules, or roughly 239,000 Calories; also, a Mg is one million grams.

Table 19: Calculating the nutrient content of palm oil food supply

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Quantity | kJ Energy/kg | g Protein/kg | g Fat/kg | Energy (GJ/day) | Protein (Mg/day) | Fat (Mg/day) |
| Palm oil | 0 | 37,000 | 0.00 | 1000.00 | 0 | 0 | 0 |
| Margarine and Shortening | 933,900 | 31,800 | 1.68 | 856.79 | 81,300 | 5 | 2,200 |
| Fat preparations nes | 162,900 | NA | NA | NA | NA | NA | NA |

Standardization of nutrients is now a simple last step: all the variables here (i.e. calories, fats, and proteins) are purely additive, so the standardized calories/fats/proteins are simply the sum of the total calories/fats/proteins for each commodity:

Table 20: Final, total nutrient supplies from palm oil

|  |  |  |  |
| --- | --- | --- | --- |
| Commodity | Energy (GJ/day) | Protein (Mg/day) | Fat (Mg/day) |
| Sugar | 81,300 | 5 | 2,200 |

To convert these figures into something more meaningful, we may divide by the population of the country. If we assume this country has 600 million inhabitants, we have:

Table 21: Final, per capita nutrient supplies from palm oil

|  |  |  |  |
| --- | --- | --- | --- |
| Commodity | Calories/person/day | g Protein/person/day | g Fat/person/day |
| Sugar | 32 | 0 | 4 |