Food Balance Sheets

## Sugar

Establishing sugar balances for FBSs/SUAs poses several challenges different from the wheat balance and therefore merits a separate and detailed presentation. Sugar can be produced from two principal crops, cane and beet and at different levels of final processing (raw, refined). The different processing levels are also associated with different by-products. In addition to the traditional sources of sugar, such as cane and beet, there is also a growing number of alternative sources for sweeteners such as High Fructose Corn Syrup (HFCS), which add to the availability of sugar and sweeteners but also to the complexity of building a consistent and standardized FBS for sugar.

As for wheat, the creation of the SUA/FBS balances starts with an empty table (Table 1), comprising all variables/elements across all sugar crops and sugar products:

Table 1: Initial table for the sugar FBS/SUA

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | - | - | - | - | - | - | - | - | - | - | - |
| Sugar Cane | - | - | - | - | - | - | - | - | - | - | - |
| Sugar and Syrups | - | - | - | - | - | - | - | - | - | - | - |
| Raw sugar | - | - | - | - | - | - | - | - | - | - | - |
| Refined sugar | - | - | - | - | - | - | - | - | - | - | - |
| Molasses | - | - | - | - | - | - | - | - | - | - | - |

### Production

For production data, we first fill in the table with available official figures (). In this case, we assume that the production quantity is known for all primary products (crops and cane) and thus no imputation is needed. If we were to have missing quantities, we would impute data as described in Chapter 2 and as shown in the wheat example. Applying appropriate extraction rates for the sugar crops will allow us to estimate sugar production e.g. in raw sugar equivalents.

Table 2: FBS/SUA table with production estimates for primary sugar crops

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | **26,210,000** | - | - | - | - | - | - | - | - | - | - |
| Sugar Cane | **26,510,000** | - | - | - | - | - | - | - | - | - | - |
| Sugar and Syrups | **-** | - | - | - | - | - | - | - | - | - | - |
| Raw sugar | **-** | - | - | - | - | - | - | - | - | - | - |
| Refined sugar | **-** | - | - | - | - | - | - | - | - | - | - |
| Molasses | **-** | - | - | - | - | - | - | - | - | - | - |

### Trade

The detailed process to arrive at the trade data for all products, including sugar is laid out in Chapter 2. The practical steps have also been presented earlier in this chapter for wheat. It should therefore suffice to mention here that the application of the trade compilation steps renders the import and export estimates as shown in Table 3, which now features both production and trade and hence almost the entire supply side of the sugar balance.

Table 3: FBS/SUA table for sugar including trade estimates

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | **194,500** | **300** | - | - | - | - | - | - | - | - |
| Sugar Cane | 26,510,000 | **9,700** | **860** | - | - | - | - | - | - | - | - |
| Sugar and Syrups | - | **265,400** | **96,200** | - | - | - | - | - | - | - | - |
| Raw sugar | - | **10** | **194,800** | - | - | - | - | - | - | - | - |
| Refined sugar | - | **1,275,200** | **111,200** | - | - | - | - | - | - | - | - |
| Molasses | - | **464,200** | **236,500** | - | - | - | - | - | - | - | - |

### Stock Changes

Generally, stocks will be held for a select number of primary level products (such as wheat or rice). That’s neither the case for cane nor for beet, both are indeed highly perishable products. Sugar is therefore stored as raw or refined sugar. The stock change in the FBS/SUA table for sugar will ideally be a quantity measured within the country, but such estimates are seldom available. If that’s the case, at least an initial estimate for stock changes must be imputed, and we do this imputation via the linear regression model on historical stock change data described in Chapter 2. Including stock changes into the working table() now completes the domestic supply side as shown in Table 4.

Table 4: FBS/SUA table for sugar including stock estimates

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | **0** | - | - | - | - | - | - | - |
| Sugar Cane | 26,510,000 | 9,700 | 860 | **0** | - | - | - | - | - | - | - |
| Sugar and Syrups | - | 265,400 | 96,200 | **0** | - | - | - | - | - | - | - |
| Raw sugar | - | 10 | 194,800 | **0** | - | - | - | - | - | - | - |
| Refined sugar | - | 1,275,200 | 111,200 | **79,500** | - | - | - | - | - | - | - |
| Molasses | - | 464,200 | 236,500 | **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. It should be noted that these are also only initial estimates of food consumption and that it is only one of many imputation methods. The final levels of food consumption will be determined in the balancing mechanism and a better estimate for sugar production and eventually availability could come from production statistics of raw and refined sugar from the sugar mills.

Also, sugar is a special case in that the food balance is not only done at the level of the sugar crops (i.e. sugar cane and sugar beet) but also at the level of raw sugar. Thus, when we later refer to the "primary level" for sugar, we will really mean the raw sugar commodity. Now, the "Food" and "Food Processing" variables are filled in for raw sugar ().

Table 5: Adding food and food processing to the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | 0 | - | - | - | - | - | - | - |
| Sugar Cane | 26,510,000 | 9,700 | 860 | 0 | - | - | - | - | - | - | - |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | - | - | - | - |
| Raw sugar | - | 10 | 194,800 | 0 | **1,513,800** | **9,795,900** | - | - | - | - | - |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | - | - | - | - |
| Molasses | - | 464,200 | 236,500 | 0 | - | - | - | - | - | - | - |

### Food Losses and Waste (FLW)

FLW are estimated using the methodology described in Chapter 2, unless losses quantities are measured by the country. We estimate losses only for sugar beet and sugar cane.

Table 6: Adding FLW to the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | 0 | - | - | - | - | - | - | **205,500** |
| Sugar Cane | 26,510,000 | 9,700 | 860 | 0 | - | - | - | - | - | - | **213,300** |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | - | - | - | **0** |
| Raw sugar | - | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | - | - | - | - | **0** |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | - | - | - | **0** |
| Molasses | - | 464,200 | 236,500 | 0 | - | - | - | - | - | - | **0** |

### Seed

Seed use for sugar beet is assumed to be zero. However, an allocation for seed from sugar cane should be done (replanting cane every 5-6 years). In this case, it is usually not actual seed usage but rather that some of the sugar cane plants are cut and replanted, thus resulting in a slightly smaller availability than would have occurred if all plants had been harvested. While this is not technically seed usage, it simplifies the food balance sheet to allocate this "utilization" under seed usage.

Table 7: Adding seed use to the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | 0 | - | - | - | **0** | - | - | 205,500 |
| Sugar Cane | 26,510,000 | 9,700 | 860 | 0 | - | - | - | **1,572,200** | - | - | 213,300 |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | **0** | - | - | 0 |
| Raw sugar | - | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | - | **0** | - | - | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | **0** | - | - | 0 |
| Molasses | - | 464,200 | 236,500 | 0 | - | - | - | **0** | - | - | 0 |

### Industrial Utilization

As with the wheat example, there is industrial use of sugar and by-products, indeed increasingly so and largely driven by the use of these products for biofuel production. It holds first and foremost for cane (and bagasse), but also beets and molasses are used for bioethanol production, notably in Europe. This allocation will be made later when we convert the sugar cane quantities into its processed products.

Table 8: Industrial use in the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | 0 | - | - | - | 0 | - | **-** | 205,500 |
| Sugar Cane | 26,510,000 | 9,700 | 860 | 0 | - | - | - | 1,572,200 | - | **-** | 213,300 |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | 0 | - | **-** | 0 |
| Raw sugar | - | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | - | 0 | - | **0** | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | 0 | - | **-** | 0 |
| Molasses | - | 464,200 | 236,500 | 0 | - | - | - | 0 | - | **-** | 0 |

### Tourist Consumption

As with the wheat example, we impute tourist consumption with the methodology outline in chapter 2. The results are plugged into our SUA/FBS table (). The imputed amount is negative, which indicates that more calories are available in the country (a decrease in utilization is mathematically equivalent to an increase in supply) because inhabitants consumed calories abroad.

Table 9: Adding tourist consumption to the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | 0 | - | - | - | 0 | **0** | - | 205,500 |
| Sugar Cane | 26,510,000 | 9,700 | 860 | 0 | - | - | - | 1,572,200 | **0** | - | 213,300 |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | 0 | **0** | - | 0 |
| Raw sugar | - | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | - | 0 | **-3,200** | 0 | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | 0 | **0** | - | 0 |
| Molasses | - | 464,200 | 236,500 | 0 | - | - | - | 0 | **0** | - | 0 |

### Feed

We note that, in order to determine feed estimates for raw sugar, we must first deduct from our total feed requirements all the commodities which are allocated entirely (or assumed to be allocated entirely) to feed. Thus, we must deduct the bran produced in the processing of wheat as well as the molasses produced in the processing of sugar beet and sugar cane. This is an important note: when compiling the food balance sheets, the quantities allocated to feed for all feed commodities must be computed before generating feed estimates for the wheat/raw sugar/etc. commodities. Thus, food balance sheets cannot be compiled one commodity tree at a time.

In order to compute the total amount of molasses, we must compute the amount of sugar beet and sugar cane allocated to processing. This is rather straightforward: we simply deduct from the supply the small amount allocated to seed and losses to compute the amount of sugar beet and sugar cane allocated to food processing.

Table 10: Adding food and food processing to the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar Beet | 26,210,000 | 194,500 | 300 | 0 | - | **26,200,000** | - | 0 | 0 | - | 205,500 |
| Sugar Cane | 26,510,000 | 9,700 | 860 | 0 | - | **24,730,000** | - | 1,572,200 | 0 | - | 213,300 |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | 0 | 0 | - | 0 |
| Raw sugar | - | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | - | 0 | -3,200 | 0 | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | 0 | 0 | - | 0 |
| Molasses | - | 464,200 | 236,500 | 0 | - | - | - | 0 | 0 | - | 0 |

We now process forward all of the sugar beet and sugar cane quantities into raw sugar and the associated by-products. The production quantities of the sugar crops were officially reported, and after a minor allocation to seed and waste, these quantities are essentially allocated to production of the processed commodities. This production is therefore also considered official.

Table 11: Completing the sugar table for by-products of sugar production/processing

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | 0 | 0 | - | 0 |
| Raw sugar | **6,389,200** | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | - | 0 | -3,200 | 0 | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | 0 | 0 | - | 0 |
| Molasses | **2,284,900** | 464,200 | 236,500 | 0 | - | - | - | 0 | 0 | - | 0 |
| Beet Pulp | **1,834,200** | **0** | **0** | **0** | **-** | **-** | **-** | **0** | **0** | **-** | **0** |
| Bagasse | **6,183,700** | **0** | **0** | **0** | **-** | **-** | **-** | **0** | **0** | **-** | **0** |

Thus, we can now determine the quantity of molasses and beet pulp (by-products of the sugar processing) feed that we have produced (). This would then inform the amount of feed that we could allocate to the commodity that we are balancing (i.e. raw sugar). However, raw sugar is rarely used as a feed product, and thus in this case we will only allocate feed usage for the two processed commodities beet pulp and molasses.

Table 12: Adding feed use to the FBS/SUA table for sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | **-** | 0 | 0 | - | 0 |
| Raw sugar | 6,389,200 | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | **0** | 0 | -3,200 | 0 | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | **-** | 0 | 0 | - | 0 |
| Molasses | 2,284,900 | 464,200 | 236,500 | 0 | - | - | **2,512,500** | 0 | 0 | - | 0 |
| Beet Pulp | 1,834,200 | 0 | 0 | 0 | - | - | **1,834,200** | 0 | 0 | - | 0 |
| Bagasse | 6,183,700 | 0 | 0 | 0 | - | - | **-** | 0 | 0 | - | 0 |

### Standardization and Balancing

Now, suppose we have the following commodity tree:

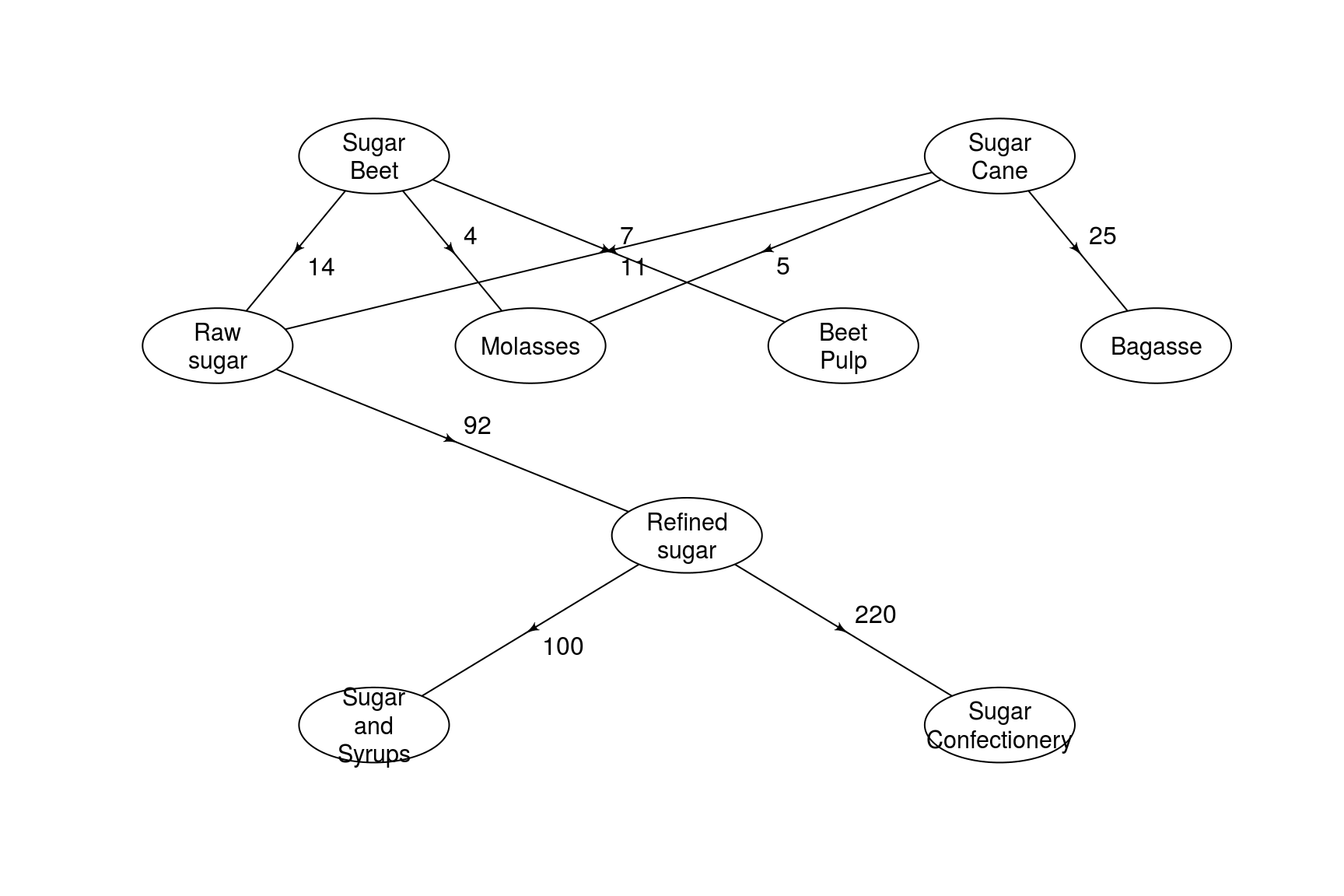


Figure 1: Processing tree for sugar crops and products

We have already eliminated the sugar cane and sugar beet commodities, and thus we are mainly interested in the task of rolling up processed sugar commodities into raw sugar. Again, here is our initial table:

Table 13: Initial table for the standardization process of sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | - | - | 0 | 0 | - | 0 |
| Raw sugar | 6,389,200 | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | 0 | 0 | -3,200 | 0 | 0 |
| Refined sugar | - | 1,275,200 | 111,200 | 79,500 | - | - | - | 0 | 0 | - | 0 |
| Molasses | 2,284,900 | 464,200 | 236,500 | 0 | - | - | 2,512,500 | 0 | 0 | - | 0 |
| Beet Pulp | 1,834,200 | 0 | 0 | 0 | - | - | 1,834,200 | 0 | 0 | - | 0 |
| Bagasse | 6,183,700 | 0 | 0 | 0 | - | - | - | 0 | 0 | - | 0 |

The next step in this process is to balance the processed commodities by creating production quantities. The standardization of the required production quantities would then be compared to our estimate for the quantity of food processing for the raw sugar commodity to ensure we have enough to cover supply/utilization deficits. However, we do not have any trade deficits, nor do we have official production of the main use of raw sugar (recall, however, in the wheat case we had official production of wheat flour). In order to maintain consistency between our "Food Processing" variable and the production of our processed commodities, we allocate the "Food Processing" of raw sugar into Production of refined sugar.

Table 14: Complete, but still unbalanced output table for refined sugar

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | - | 0 | - | 0 | 0 | - | 0 |
| Raw sugar | 6,389,200 | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | 0 | 0 | -3,200 | 0 | 0 |
| Refined sugar | **9,012,200** | 1,275,200 | 111,200 | 79,500 | - | 0 | - | 0 | 0 | - | 0 |
| Molasses | 2,284,900 | 464,200 | 236,500 | 0 | - | 0 | 2,512,500 | 0 | 0 | - | 0 |
| Beet Pulp | 1,834,200 | 0 | 0 | 0 | - | 0 | 1,834,200 | 0 | 0 | - | 0 |
| Bagasse | 6,183,700 | 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).

Table 15: Output table for refined sugar, balanced at processing levels

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Food Processing | Feed | Seed | Tourist | Industrial | Loss |
| Sugar and Syrups | - | 265,400 | 96,200 | 0 | **169,200** | 0 | 0 | 0 | 0 | 0 | 0 |
| Raw sugar | 6,389,200 | 10 | 194,800 | 0 | 1,513,800 | 9,795,900 | 0 | 0 | -3,200 | 0 | 0 |
| Refined sugar | 9,012,200 | 1,275,200 | 111,200 | 79,500 | **10,100,000** | 0 | 0 | 0 | 0 | 0 | 0 |
| Molasses | 2,284,900 | 464,200 | 236,500 | 0 | 0 | 0 | 2,512,500 | 0 | 0 | 0 | 0 |
| Beet Pulp | 1,834,200 | 0 | 0 | 0 | 0 | 0 | 1,834,200 | 0 | 0 | 0 | 0 |
| Bagasse | 6,183,700 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **6,183,700** | 0 |

The next step is to aggregate this full table back into the primary commodity equivalent (in this case raw sugar). We follow the same aggregation/standardization process as outlined in the wheat example. We should note here that molasses, beet pulp, and bagasse are standardized to a different primary equivalent in the commodity balances and thus are not considered here. The results are presented in .

Table 16: Initial (unbalanced) table for Raw sugar, containing all standardized products

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Production | Imports | Exports | Stock Change | Food | Feed | Seed | Tourist | Industrial | Loss |
| Raw sugar | 6,389,200 | 1,674,600 | 420,200 | 86,400 | 12,670,000 | 0 | 0 | -3,200 | 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. These assumptions lead us to Table 17.

Table 17: Unbalanced table for raw sugar, including standard deviations

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Production | Imports | Exports | Stock Change | Food | Feed | Seed | Tourist | Industrial | Loss |
| Mean | 6,389,200 | 1,674,600 | 420,200 | 86,400 | 12,670,000 | 0 | 0 | -3,200 | 0 | 0 |
| Standard Dev. | 0 | 0 | 0 | 24,200 | 1,203,600 | 0 | 0 | -3,200 | 0 | 0 |

After balancing the above tables, we have a new table () 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: Final balanced table for raw sugar, including all processed commodities

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Production | Imports | Exports | Stock Change | Food | Feed | Seed | Tourist | Industrial | Loss |
| Mean | 6,389,200 | 1,674,600 | 420,200 | 84,300 | 7,562,500 | 0 | 0 | -3,300 | 0 | 0 |
| Standard Dev. | 0 | 0 | 0 | 24,200 | 1,203,600 | 0 | 0 | -3,200 | 0 | 0 |

After balancing, some quantities are updated (and some remain unchanged, if they have a standard deviation of zero). In the example of wheat, the aggregated table was placed directly into the food balance sheet. In this case, sugar is not the only commodity at the primary/FBS level; instead, it is reported under "Sugar & Sweeteners". Thus, balances must also be performed for the other commodities (i.e. honey and artificial sweeteners) and added to this balance to create the final FBS row.

The next step in our example is to calculate the calories, fats, and proteins. As with the wheat, this can be done as soon as we have food values available for the SUA level commodities (). We do this calculation by applying the calorie/fat/protein content nutritive factors to all SUA items with a non-zero food quantity. However, 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. Thus, the values reported in the table below are all roughly 40% less than their original value; this is because the "pre-balanced" food value was roughly 12.7 million and the balanced food value roughly 7.6 million, a decrease of about 40%. 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: Calorie, protein, and fat quantities for consumed sugar products

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Quantity | kJ Energy/kg | g Protein/kg | g Fat/kg | Energy (GJ/day) | Protein (Mg/day) | Fat (Mg/day) |
| Sugar and Syrups | 101,000 | NA | NA | NA | NA | NA | NA |
| Raw sugar | 903,600 | NA | NA | NA | NA | NA | NA |
| Refined sugar | 6,026,600 | 17,000 | 0 | 0 | 280,600 | 0 | 0 |
| Caloric beverages | 142,200 | 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: Total calories/proteins/fats from sugar (per year)

|  |  |  |  |
| --- | --- | --- | --- |
| Commodity | Energy (GJ/day) | Protein (Mg/day) | Fat (Mg/day) |
| Sugar | 280,600 | 0 | 0 |

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 obtain the per capita estimates are per :

Table 21: Daily per capita calories/proteins/fats for sugar

|  |  |  |  |
| --- | --- | --- | --- |
| Commodity | Calories/person/day | g Protein/person/day | g Fat/person/day |
| Sugar | 112 | 0 | 0 |