The Republic of Rwanda

NATIONAL INSTITUTE OF STATISTICS OF RWANDA

RWANDA FOOD BALANCE SHEETS 2017-2021

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AFRICAN DEVLOPEMENT BANK GROUP
GROUPE DE LA BANQUE AFRICAINE
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ABBREVIATIONS AND ACRONYMS

AfDB:	African Development Bank
CPI:	Consumer Price Index
CV:	Coefficient of variation
CPC:	Central Products Classification
CPI:	Consumer Price Index
COMESA:	Common Market for Eastern and Southern Africa
GSARS:	Global Strategy for Improving Agricultural and Rural Statistics
DG:	Director General
DES:	Dietary Energy Supply
DHS:	Demographic and Health Surveys
EAC:	East African Community
FAO:	Food and Agriculture Organization
FBS:	Food Balance Sheets
FLI:	Food Loss Index
FLP:	Food Loss Percentage
GDP:	Gross Domestic Product
GSARS:	Global Strategy to improve Agricultural and Rural Statistics
HA:	Hectare
HS:	Harmonized System
IDR:	Import Dependency Ratio
KG:	Kilogram
Kcal:	Kilo calorie
MINAGRI:	Ministry of Agriculture and Animal Resources
MDER:	Minimum Dietary Energy Requirements
MINICOM:	Ministry of Trade and Industry
MOH:	Ministry of Health
MT:	Metric Ton
NBR:	National Bank of Rwanda
NISR:	National Institute of Statistics of Rwanda
PoU:	Prevalence of Undernourishment
PSTA:	Strategy Plan for Transformation of Agriculture
RAB:	Rwanda Agriculture Board
RBC:	Rwanda Biomedical Center
RHPC:	Rwanda Housing and Population Census
SAS:	Seasonal Agricultural Survey
SCB:	Statistical Capacity Building
SDGs:	Sustainable Development Goals
SPARS:	Strategic Plan for Agriculture and Rural Statistics
SPIU:	Single Project Implementation Unit
SSR:	Self-Sufficiency Ratio
SUA:	Supply and Utilization Accounts
TCF:	Technical Conversion Factors
TWG:	Technical Working Group
UNPD:	United Nations Population's Division

Foreword

The National Institute of Statistics of Rwanda (NISR), with technical and financial assistance from the African Development Bank (AfDB), the Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC), and in collaboration with the Ministry of Agriculture and Animal Resources (MINAGRI) and its agencies, has prepared the first edition of Rwanda Food Balance Sheets (FBS) Report.

The FBS results provide information on national food supplies and consumption. It is used to estimate the country's dietary energy supply per capita, as well as the dietary contents of proteins and fats in a given year. The FBS data also help in determining whether a country is self-sufficient or relies on imports to feed itself. Furthermore, the FBS can be used to measure and monitor progress on some of the Sustainable Development Goals (SDGs) food security indicators, namely the Prevalence of Undernourishment (PoU) and the Food Loss Index (FLI).

The AfDB, COMESA and EAC support has led to building a sustainable foundation for generating internationally comparable FBS data. Indeed, in addition to strengthening the capacity of the national Technical Working Group (TWG) on FBS in this field, which enables continued FBS compilation in Rwanda, the first FBS results and related report of this kind in the history of the country has been produced for the years 2017-2021. NISR is extremely grateful to AfDB and COMESA for the technical assistance received during this exercise, and is committed to a regular compilation and publication of the FBS in Rwanda.

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Director General
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Acknowledgment

This report presents the results of Rwanda's Food Balance Sheets (FBS), which provides a comprehensive picture of the country's food supply and utilization patterns from 2017 to 2021.

The production of this report has been enabled by input from a number of officials from the National Institute of Statistics of Rwanda (NISR), the Ministry of Agriculture and Animal Resources (MINAGRI) and its agencies, as well as Ministry of Trade and Industry (MINICOM). Sincere appreciation to the teams from NISR, MINAGRI and its agencies, and MINICOM, who participated in the national training workshop, particularly those who provided the basic data that were used in compiling the Supply Utilization Accounts and Food Balance Sheets (SUA/FBS).

The report would not have been possible without the technical assistance of the African Development Bank (AfDB), Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC). Thus, the NISR is grateful to the AfDB and COMESA experts who were involved in the whole process. Specially, Mr. Vincent NGENDAKUMANA (AfDB Principal Agriculture Statistician), who supervised the entire Project, and Mr. Salou Bande (COMESA International Consultant), who provided technical assistance to staff from the NISR, MINAGRI & its agencies, and MINICOM, and Ministry of Agriculture and Animal Resources (MINAGRI) during the national training workshop and during the compilation of SUA/FBS.

Special thanks to the NISR core team and the AfDB national consultant who worked on compiling and writing this report. The team included Baba-Ali MWANGO, the AfDB national consultant who assisted the NISR team in producing the FBS report, as well as NISR officials, namely Mr. MWIZERWA Jean Claude (Director of Economic Statistics) who oversaw the entire process of compiling FBS, Mr. MUVUNYI Issa (Statistician, Livestock and fisheries), and Mr. ABAYISENGA Aimable (Team leader of Agriculture and Environmental Statistics) who contributed towards data gathering and actual FBS compilation, and Mr. MUTEBUTSI Alexis (Single Project Implementation Unit -SPIU- Research Assistant) who worked on the FBS report write up.

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Executive Summary

Overview

The FBS is a national accounting/statistical framework, presenting a comprehensive picture of the pattern of a country's food supply and utilization during a specified reference period. It is useful in tracking progress against some of the established development goals, such as two of the Sustainable Development Goals (SDGs). It also acts as a monitoring and evaluation tool for national agricultural policies. One of the main applications of FBS is to calculate derived indicators which can be used to analyse a wide range of concepts, including hunger, malnutrition, import dependence and food self-sufficiency. Among the major outputs of the FBS is the computation of Dietary Energy Supply (DES), which is an important indicator in determining the levels of undernourishment in a given country, supply of proteins as well as fats.

Methodology

The compilation of Rwanda FBS 2017-2021 started with the development of the road map that outlined key activities, timeline indicating the schedule, milestones, deliverables, and expected resources to establish a robust and sustainable Supply and Utilization Accounts (SUA) and FBS statistics system. This was followed by setting up institutional arrangements whereby a TWG_FBS was established to technically handle and coordinate the Rwanda FBS compilation process. The key institutional players were NISR and MINAGRI. Other involved key activities were: SUA/FBS basic data collection and preparation of FBS compilation Tool, national training workshop, data compilation using a developed FBS compilation tool, results generation and validation, report writing, editing and graphic design, and management and archiving SUA/FBS database.

Data sources

The most important part of the required basic data for SUA/FBS compilation are available within NISR and Ministry of Agriculture and Animal Resources (MINAGRI). Specially, the following were the sources of data used:

- **Surveys and Census:** For Crop production, Seeds and seed rates from Seasonal Agricultural Survey (SAS), Anthropometric data from Demographic and Health Surveys (DHS), Population data from Rwanda Housing and Population Census (RHPC), and Commodity prices from Consumer Price Index (CPI).
- **National accounts:** For Processed commodities, Livestock production, Stock variations, Food ratios, Feed and feed ratios, Fisheries and Gross Domestic Product (GDP).
- **Administrative data sources:** For Trade data (imports and exports), and Livestock numbers, Loss and loss ratios (from MINAGRI).
- **FAO:** For Technical conversion factors (Nutritional values, Extraction rates, and Loss ratios for some commodities).

Key results

Food supply per capita per year

The findings indicate that, on average during 2017-2021, starchy roots are a dominant vegetal group in food supply with an estimated 256.3 kg/cap/year, followed by fruits (82 kg/cap/year) and cereals (78 kg/cap/year). Milk and products (7.5 kg/cap/year) were the most contributors to food supply among other animal products, followed by meat and fisheries. Sweet potatoes, cassava, and Irish potatoes, as well as their products, account for 95 percent of starchy roots. On another hand, plantains and bananas contribute the most to food supply for the fruits group; while that, maize & products, rice, and sorghum and products are more readily available cereal foods than others.

Overall calories, proteins and fats supply per capita per day

The results indicate that vegetal products contributed 98 percent of the total Dietary Energy Supply (DES) per capita per day during the review period, while the contribution of animal products is very low, with only 2 percent. According to the same FBS results, calorific supply increased slightly from 2157 Kcal/cap/day in 2017 to 2206 Kcal/cap/day in 2021, but decreased to 2136

Kcal/cap/day in 2019. The decrease in 2019 DES is associated with drop in domestic supply (Production + Net trade - Stock variation), mainly on cereals. This decrease in 2019 domestic supply is driven by drop in imports of maize and products, rice and products, sorghum and products, and beans, as well as increase in rice and beans exports. The results spot a stable supply of proteins per capita per day throughout the review period. Evidently, vegetal products were the main source of protein in Rwanda, with pulses and cereals providing more protein than other vegetal groups; while the proteins supply from animal products is very low as a result of low quantity available for consumption in the country. Similarly, to proteins and calories, vegetal products are the dominant source of fats in Rwanda, with 92% share to the total level of daily per capita fats.

Table 1: Overall calories, proteins and fats supply per capita per day

	2017	2018	2019	2020	2021	Average
DES per capita per day (Kcal)	2,157	2,176	2,136	2,184	2,206	2,172
Daily per capita proteins (grams)	56	57	55	55	56	56
Daily per capita fats (grams)	26.2	27.2	27.2	29.1	28.2	27.6

Self-Sufficiency Ratio

According to the results, the Self-Sufficiency Ratio (SSR) is estimated to be 81.4 percent on average for the period under study. SSR averaged 81.2% for vegetal products and 93.6% for animal products, implying that Rwandans consume more of domestic foods. This means that local production was insufficient to bridge the food supply gap for the period under consideration (2017-2021), necessitating the use of imports and stocks, whereas animal product production was nearly sufficient for domestic consumption.

Table 2: Self-Sufficiency Ratio (SSR)

Self Sufficiency Ratio (%)	2017	2018	2019	2020	2021	Average
Total	79.0	80.6	82.8	80.7	83.9	81.4
Vegetal products	78.8	80.4	82.6	80.5	83.7	81.2
Animal products	91.5	96.1	92.9	91.9	95.8	93.6

Import Dependency ratio

The FBS results indicate that the Import Dependency Ratio (IDR) for vegetal and animal products averaged 32.8% and 18%, respectively, making a total average of 32.5% over the period 2017-2021. This implies that about 32.8% and 18.0% of domestic supply of vegetal products and animal products are procured from imports. The low value of IDR for vegetal products is observed in 2019 and this is due to the decrease of Imports of maize and products, from 146,000 metric tons in 2018 to 81,000 metric tons in 2019. Regarding the animal products, the low value of IDR in 2020 is explained by the decrease of import of milk and products, from 35,000 metric tons in 2019 to 29,000 metric tons.

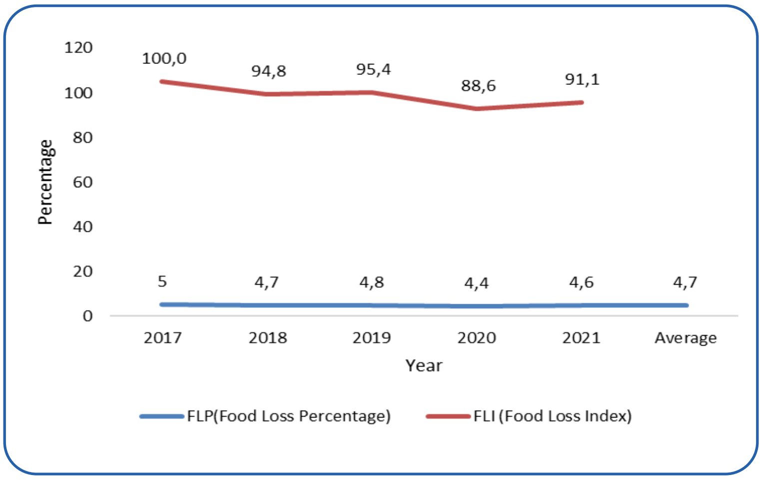
Table 3: Import Dependency Ratio (IDR)

Import Dependency Ratio (%)	2017	2018	2019	2020	2021	Average
Total	33.8	33.2	30.4	32.3	33	32.5
Vegetal products	34.1	33.4	30.6	32.5	33.2	32.8
Animal products	18.4	19.2	18.1	15.6	18.6	18

Food Loss Percentage and Food Loss Index

The results show that from 2017 to 2021, the Food Loss Percentage (FLP) for Rwanda was estimated at an average of 4.7%, implying that 4.7% of the key commodities were lost along the supply chain and did not reach the retail stage. Only losses for 10 key selected commodities were considered, including raw milk of cattle, dry beans, wheat, wheat flour, maize (corn), rice, plantains (cooking banana), fresh cassava, sweet potatoes and irish potatoes. There was a fluctuation in the trend of Food Loss Index (FLI) over the period 2017-2021. In fact, The FLI decreased from 100 to 94.8 percent, due to the decrease of loss percentages for beans dry, wheat flour, maize and rice. This is followed by a slight increase of the Index in 2019 due to the slight increase of loss percentage for beans. The lowest value of the Index is observed in 2020 and this situation is explained by simultaneous decrease of loss percentages for beans dry, maize and rice.

Figure 1: Food Loss Percentage and Food Loss Index



Prevalence of Undernourishment

According to FBS results, the Prevalence of Undernourishment (PoU) in Rwanda was estimated at about 33 percent; in other words, around 4 million of people in Rwanda were undernourished during the reference period. The analysis shows that the Minimum Dietary Energy Requirements (MDER) increased from 1730 Kcal/cap/day to 1743 Kcal/cap/day over the reference period. The same trend was observed for the number of people whose food intake was insufficient to meet the Minimum Dietary Energy Requirements with a continuous increasing from 3.9 million in 2017 to 4.3 million in 2019, and 4.1 million for both 2020 and 2021. The highest value of PoU is observed in 2019 with 34%. This is due to the lowest value of overall DES for the same year (daily per capita DES is 2,136 Kcal/ cap/day in 2019).

Table 4: Prevalence of Undernourishment

	2017	2018	2019	2020	2021	Average
PoU	33%	32%	34%	32%	32%	2,172
Pop. in millions	3.9	3.9	4.3	4.1	4.1	56
MDER (Kcal/cap/day)	1 730	1 733	1 737	1 740	1 743	27.6

Constraints and limitations

During the exercise of compiling Rwanda FBS, the following limitations were identified:

- Capacity of local staff in compilation of FBS was limited since it was the first time FBS was compiled in Rwanda. The AfDB/ COMESA international consultant was involved in the whole compilation process to ensure the compilation is completed.
- Lack of country level basic data such as, nutrient factors and Technical Conversion Factors (TCF) like extraction, seed and loss rates data. The national FBS Team resorted to using related TCF and standard nutrient factors used in FAOSTAT.

Lessons learnt

- The training of national experts is crucial to initiate the activities of FBS compilation. This is not only for theoretical aspects, but also through hands-on exercises and practices, to allow participants to assimilate all aspects of the methodology, and how this is applied to real cases.
- The FBS compilation has demonstrated that, there is room for deep statistical analysis of existing data, given the variety of data and level of precision needed.
- Sustaining FBS compilation is perceived as an opportunity to bridge the data gaps through expanded data collection, while participative approach leads to success in the process of compiling FBS.

Way forward

Given the importance of FBS data in reflecting Rwanda's food security situation, the National Institute of Statistics of Rwanda is committed to continuing to produce FBS data on a regular basis. The way forward is to produce the FBS results for 2022 in the first quarter of 2023 and maintain continuity thereafter, ensuring timely availability of FBS data for users.

CHAPTER 1. GENERAL INTRODUCTION

1.0. Context

Agriculture is one of the most important pillars of the economic growth for Rwanda. According to the 2020 Agricultural Household survey, 80.1 percent of households are agricultural holdings (engaged in either crop or livestock production). The sector contributes 25 percent of Rwanda's Gross Domestic Product (GDP). Agriculture in Rwanda constitutes the main economic activity for the rural households and remains their main source of income. In recognition of its potential in economic development, food security and poverty reduction, the Government has set an ambitious agricultural agenda under the new strategy for transformation of agriculture (PSTA 4[1]), aiming at transformation of Rwandan agriculture from a sector characterized by low productivity to a sector using knowledge to increase productivity and investing in value addition and commercialization.

Quality agriculture statistics are then crucial in evaluating the performance of national agricultural programs and hence, imperative for evidence-based decision making. While the use of statistics in decision-making processes continues to grow, the demand for agriculture data is also increasing.

The African Development Bank (AfDB) played an important role in improving agricultural statistics system in Rwanda. Indeed, within the implementation of the Africa Action Plan of the Global Strategy for Improving Agricultural and Rural Statistics, which ran from 2012-2018, the Bank has contributed to the revival of the National Agricultural Statistical System in the country. It provided Technical Assistance in the preparation of the Strategic Plan for Agriculture and Rural Statistics for Rwanda (SPARS-RWANDA), which was completed in 2018; this is an important strategic document for the development of the Agriculture Statistics System of the country, proposed to run from 2018/2019 – 2023/2024. That is in addition to many other statistical capacity building opportunities offered through several regional training workshops in different areas of agriculture statistics organized by the Bank on the continent in 2012-2018.

[1] Strategy Plan for Transformation of Agriculture.

In the interest of continuous improvement of Agricultural statistics in Rwanda, the National Institute of Statistics of Rwanda (NISR) requested to AfDB a Technical Assistance to establish a robust and sustainable Food Balance Sheets compilation system. This has been provided within Phase 5 of the Statistical Capacity Building (SCB-5) program of the Bank, which is administrated by the Common Market for Eastern and Southern Africa (COMESA).

1.1. Overview and potential uses of Food Balance Sheets (FBS)

The FBS is a national accounting/statistical framework showing a comprehensive picture of the food supply and utilization in a given country during a specified reference period. It shows the quantities and types of food available for human consumption, specifying all potential sources of both supply and utilization of any food product. The total supply of a given food product includes the amount produced, the amount imported, and the amount of the product that is either added to or taken from stocks.

Total Supply = Product + Imports – Stock variation

The total utilization of a given food product includes the amount of food exported, food lost along the supply chain, amount of food taken as livestock feed, amount used for seed, food consumed by tourists, food used for processing, food consumed by households, food for industrial use, and residual uses

Total Utilization = Exports + Feed + Seed + Loss + Food processing + Food +Tourist food + Industrial use + Residual and other uses

The quantities allocated to all sources of total supply must be equal to the quantities allocated to all types of utilization. The balancing of total supply and total utilization of food consumption is known as Supply Utilization Accounts (SUAs).

The Food Balance Sheets (FBS) is a report generated from the SUAs framework, where derived food commodities are expressed into primary equivalent.

Food Balance Sheets (FBS) are crucial in assessing countries' resilience vis-à-vis food security of their populations. By analyzing Dietary Energy Requirements and Dietary Energy Supply, estimates on undernourished population can be derived. This is key for evidence-based planning and monitoring the progress towards achievement of SDG Target 2.1 **(viz.: "*By 2030, to end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round*").**

The availability of complete and up to date FBS statistics allows to measure self-sufficiency with respect to food production (ratio of domestic production to domestic demand) and a country's dependency to imports (ratio of imports to domestic demand). These metrics produced by commodity or at the aggregate level, constitute very useful pieces of information for decision-makers in the agricultural sector to assess the gaps in terms of food supply, as well as to better orient public and private investments.

In addition, FBS are necessary in the derivation of (i) indicators for assessing the quality of nutrition and dietary composition evolution over time, and (iii) the Food Loss Index (FLI), which is another important Sustainable Development Goals (SDG) indicator **(SDG Target 12.3, *which seeks to halve per capita global food waste at retail and consumer levels, and to reduce food losses along production and supply chains, including post-harvest losses*)**. All these statistics are of crucial importance for decision-makers, particularly in the agricultural sector, in order to assess resilience in the food supply chain and to take prompt remedial actions if needed.

Once SUAs are established for each food commodity, and in addition to help generating FBS results, this constitutes another important statistical way of improving the quality and quantity of data on the sector.

1.2. Concepts and definitions

A Food Balance Sheets (FBS) can be defined as an aggregated and analytical data set that "presents a comprehensive picture of the pattern of a country's food supply during a specified reference period. This is achieved within an accounting framework, wherein all potential sources of both supply and utilization of a given food product are specified.

1.2.1. Definition of SUA components

This section summarises definitions of the concepts used in the compilation of the FBS. They are the variables that make up the "Supply = Utilisation" identity.

Production + Imports – ΔStocks = Exports + Food + Feed + Seed + Tourist Food + Industrial Use + Loss + Residual Use and other uses

1.2.1.1. Production

This refers to all production quantities of a given commodity within a country. The concept comprises production of primary as well as derived or processed goods. The production component includes crops, livestock, and fisheries. The component comprises production of food primary as well as processed products.

The production of primary products is reported at the farm-gate level, so that it does not include harvest loss. The quantity of processed products for a given commodity refers to the volumes of output obtained after the transformation of that commodity. The quantity of meat production should include both commercial and farm slaughter. The production of any derived or processed commodities refers to the total output of the product after transformation. This transformation may occur either within the household or at a commercial establishment. It should be noted that the standard unit for the reporting of agricultural production at the international level is the metric ton.

1.2.1.2. Imports & Exports

The general definition of imports and exports cover goods and services. However, in the framework of Food Balance Sheets, this coverage is restricted to goods. An import refers to a product brought into a given country from an external source. Exports can be understood as trans-boundary flow of goods from a given country of origin. It is important to underline that re-export, which refers to goods that enter and exit a given country without any type of transformation, should be added to exports.

1.2.1.3. Stocks

Stocks are defined as the aggregate total of products held for later use (irrespective of their intended future utilization). Stocks can be held by a variety of actors (governments, manufacturers, importers, exporters, wholesale merchants and farmers) at any level of the supply chain, from production up to -but excluding- retail. In the case of FBS, it is considered stocks variation, and not the quantities of stocks themselves. It comprises changes in stocks occurring during the reference period at all levels from production to retail level. Stock variation is defined as closing stocks minus opening stocks. Stock change may be positive (when we add to stock) or negative (when we remove (withdrawal) from stock).

1.2.1.4. Food availability

The concept of "Food availability" in respect of FBS refers to quantities of any substance, whether raw, processed or semi-processed (including drinks) available for human consumption during a given reference period at the retail level by the country's resident population. For this reason, any waste (and/or loss) that occurs at the retail or consumer levels is included in this quantity, since that food was technically available for human consumption.

1.2.1.5. Food processing

Food processing refers to quantities of a food products that are directed toward a manufacturing process and are then transformed into a different edible commodity. Food processing quantities are linked to the production of derived commodities through extraction rates.

1.2.1.6. Feed

Feed is defined as all quantity of commodities -both domestically produced and imported- that are available for feeding livestock.

1.2.1.7. Seed

Seed is defined as any quantity of a commodity set aside for reproductive purposes. This can include seed for sowing, plants for transplanting, eggs for hatching, and fish used as bait. Seeds use in a given year t is a function of a seeding rate and a sown area in the following year, t+1.

Seeds use

$(MT)_t$ = Seed rate (Mt/ha)*Sown area $(HA)_{t+1}$

Mt: Metric Ton; ha: Hectare

1.2.1.8. Loss

Food loss refers to the quantities of a product that leave the supply chain and are not diverted to other uses. Loss results from an involuntary activity and can occur at any node of the supply chain after the harvest and up to (but excluding) the retail/consumption stage.

1.2.1.9. Tourist food

Tourist food refers to food that is available for consumption by non-resident visitors in a given country during the course of their stay. This variable is expressed in net terms in the FBS (as food available for consumption by incoming visitors minus food that would have been consumed by residents who have travelled to other countries).

1.2.1.10. Industrial use

Industrial use is defined as any quantity of a given food product used in some non-food transformation or manufacturing process, including products used in biofuels, cosmetics, detergents, or paints.

1.2.1.11. Residual and other uses

Residual and other uses can, in most cases, be defined as the combined imbalance and accumulated error in the supply equals utilization equation. As such, this category is computed ex-post as a balancing item and is not independently estimated. If all other utilizations within the equation are accounted for, and there is no measurement error, then the residual would be calculated as zero.

1.2.2. Additional variables

The basic supply and utilization components described above cover all aspects of basic identity. However, some additional variables are needed to estimate per capita nutrient availability. These include the following:

1.2.2.1. Population

This is defined according to the UN Population Division's (UNPD) definition as, "de facto population in a country, area or region as of 1 July of the year indicated." This definition includes not only citizens, but also all other residents.

1.2.2.2. Extraction rates

These are parameters that reflect the loss in weight in the conversion of a given primary product to the derived product. Extraction rates are typically expressed as a percentage, and are calculated as the amount (by weight) of the derived product that is produced using a given amount of input product. The formula is as flows:

$$\text{Extraction rate (\%)} = \frac{Quantity\ of\ Output}{Quantity\ of\ Input}\ X\ 100$$

For instance, to obtain 80 metric tons of wheat flour we need to process 100 metric tons of wheat (primary), the corresponding extraction rate is 80/100*100=80%. The Ouput is flour of maize (80 metric tons) and the input is wheat (primary) with 100 metric tons.

1.2.2.3. Nutrients estimates

Nutrients are substances that the body needs to function properly. One of the main motivations for establishing Food Balance Sheets is to obtain estimates of the amount of calories, fat and protein that can be consumed by a country's population. These estimates are derived from the final "food" estimates on the balance sheet for each product by applying certain conversion factors to these quantities.

1.2.2.4. Activity and productivity variables

These refer to data on other relevant variables that could be necessary for the imputation of missing values. Some examples are shown in the table below:

Table 5: Activity and productivity variables

Variables	Crops	Livestock
Activity variables	Area sown Area harvested	Number of milking animals Number of slaughtered animals Number of laying poultry
Productivity variables	Yield	Carcass weight

1.2.2.5. Processing shares

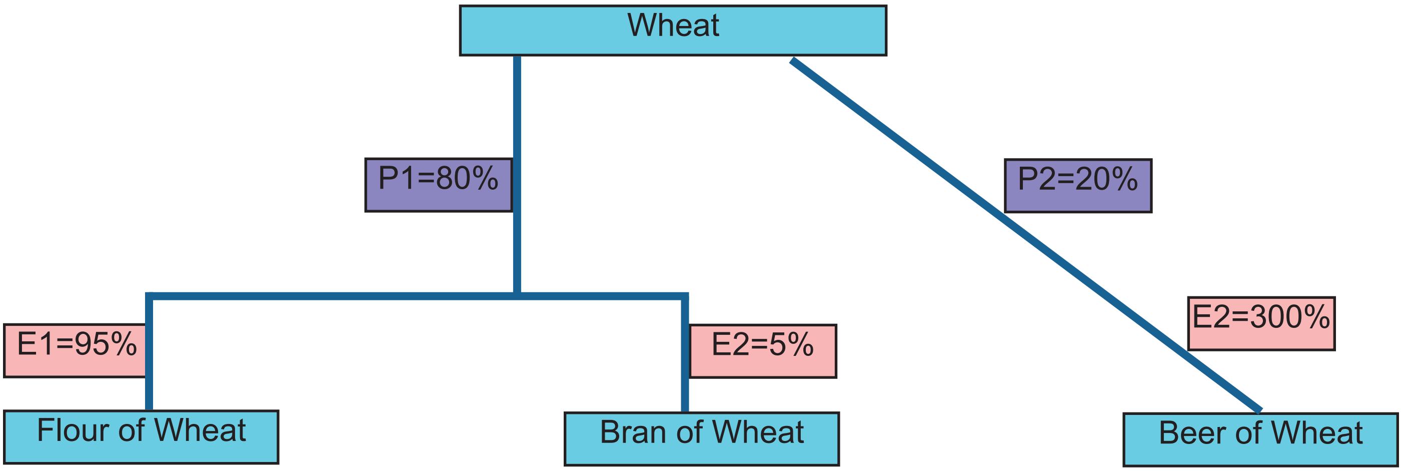
In the context of the FBS, processing shares are percentages of the amount of a given commodity that are thought to be dedicated to a specific transformation process. They are often necessary for the composition of FBS because goods can be processed into a range of derived products, and the input used for the production of these derived goods is seldom known with certainty. As such, shares can be applied to the amount of a good sent for processing to calculate the volume of input into a given transformation process. An extraction rate can then be applied to those inputted quantities to derive a production estimate. The illustration below will help to understand more the concept of processing shares.

In the example below, the primary wheat can be processed to flour of wheat with the value of processing share P1=80%. The same processing share P1=80% corresponds to the bran of wheat because flour of wheat and bran of wheat are co-products[2] . The corresponding processing share for beer of wheat is P2=20%. It means that 80% of the quantity of wheat available for processing goes to flour of wheat and bran of wheat and 20% of that quantity goes to beer of wheat. In addition to that the commodity tree below shows the corresponding extraction rates:

[2] Multiple products that are produced from a single transformation process are called co-products. It means when processing primary wheat to wheat flour, we produce at the same time the bran of wheat.

Table 6: Extraction rates

Input	Output	Extraction Rate (%)
Wheat	Flour of Wheat	95
Wheat	Bran of Wheat	5
Wheat	Beer of Wheat	300 [3]



Let us assume that the quantity of primary wheat available for processing is 1,000 metric tons. When we apply the processing shares, we get the quantity of input for wheat flour which is P1*1,000/100= 80*1,000/100=800 metric tons. Using the same logic we get the quantity of wheat (input) going to beer of wheat: P2*1,000/100=20*1,000/100=200 metric tons. Knowing the extractions rates we can come up the quantity of output for each processed commodity as shown in the table below:

Table 7: Demonstration of extraction rates usage

Commodity	Extraction Rate (%)	Quantity of input (wheat primary) tonne	Quantity produced (tonne)
Flour of wheat	95	800	800*95/100=760
Bran of wheat	5	800	800*5/100= 40
Beer of wheat	300	200	200*300/100= 600

[3] The extraction rate wheat-beer of wheat is more than 100% because of water added to get the output. Extraction rate =300% means that 1 kg of wheat gives 3 kg of beer of wheat.

1.2.3. FBS derived indicators

In the course of analyzing the food situation of a country, one of the important aspects is to know how much of the available domestic food supply has been imported and how much comes from the country's domestic production. There are two (2) indicators used to measure these aspects; The Self-Sufficiency Ratio (SSR) and the Import Dependency Ratio (IDR). These indicators are used to portray the capacity of a country to feed its people based on its own production and/or food imports from other countries.

1.2.3.1. Self-Sufficiency Ratio (SSR)

This indicator compares the magnitude of a country's agricultural production to its domestic utilization.

$$SSR = \frac{Production}{Production + Imports - Exports - \Delta\, Stock} X\ 100$$

1.2.3.2. Import Dependency Ratio (IDR)

This indicator compares the magnitude of a country's imports to its domestic utilization.

$$IDR = \frac{Imports}{Production + Imports - Exports - \Delta\, Stock} X\ 100$$

Note: The minimum value for SSR and IDR is zero. These two indicators are not expected to have negative values for the simple reason that none of the involved variables (production, import and domestic supply) can be negative. However, SSR and IDR can be more than 100%. When the SSR is more than 100%, it means that the production is higher than the domestic use. In this case, the surplus represents the proportion of net exports and/or transfers to stocks.

In the same logic, when the IDR of a given commodity is higher than 100%, it means that the quantity exported plus the quantity transferred to stocks is higher than the production of that commodity. Computing SSR and IDR at an aggregate level which involves heterogenous products (e.g. grand total, vegetal products group, and animal product group), requires the weight of such products to be converted first in a standard and homogeneous unit, such as caloric contents.

1.2.3.3. Food Loss Index

The objective of the Sustainable Development Goal (SDG) 12 is to "Ensure sustainable consumption and production patterns", with the more specific Target 12.3 which aims at "By 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses, food loss percentages by commodity and in aggregate by country". The Food Loss Index (FLI) is the indicator used to measure and monitor food losses along the supply chain, from production to retail level. The purpose of this Index is to allow for policy makers to look at the positive and negative trends in food loss over time. Analyzing the trend (versus the level) helps monitoring the food supply system in order to improve efficiency against food losses.

The steps for compiling the FLI from FBS data are as follows:

a. Select basket of commodities;
b. Compile Food Loss Percentages (FLP) for a given year;
c. Compile the FLI as a ratio of FLP in current period to FLP in base year; and
d. Interpret the results.

The selection of the basket of commodities is based on the international dollar value of the commodity in the base year. The default selection criterion followed at international level is to select 10 priority commodities as following:

- Compile value of production for every commodity;
- Group commodities by category and rank them; and
- Select the top two crops per category/ commodity group.

The 10 commodities should be within the five main headings, with two commodities per heading (1. Cereals & Pulses, 2. Fruits &

Vegetables, 3. Roots & Tubers and Oil-Bearing crops, 4. Animals Products, 5. Fish and Fish Products). The Food Loss Percentage (FLP) over the commodity basket in a given year t is computed as follow:

$$FLP_t = \frac{\sum_j L_{jt} * (q_{jt_o} * p_{jt_o})}{\sum_j (q_{jt_o} * p_{jt_o})}$$

Where:

L_{jt} = loss percentage (estimated or observed) for commodity j in year t;
t_o = the base year;
q_{jto} = Production plus Imports for commodity j in the base year; and
p_{jto} = International dollar price for commodity j in the base year.

In addition to the FBS results, the computation of FLI requires data on commodity prices. The annual loss percentage for a commodity j is computed as the sum of the total value of losses for each year divided by the base year's production value. The FLP is the average percentage of supply that does not reach the retail stage. It gives the average level of losses and these help countries to assess the magnitude of the problem relatively to other countries or in the international context. The FLP positions a country's food system efficiency and summarizes the magnitude of the problem. The FLI is computed as a ratio of Food Loss Percentage (FLP) in the current period to the FLP in the base period multiplied by 100, as per the formula below:

$$FLI_t = \frac{FLP_t}{FLP_{t_o}} \text{ x } 100$$

The FLI shows how much losses move from the baseline value equal to 100 in the base year, thus it reveals trends in efficiency over time. For example, if the FLP changes from 20% in the base period (set at 100) to 15% in the current period, the FLI will return a value of 75 in the current year, meaning that there has been an efficiency gain of 25 percentage points in the food system, hence a higher share of total supply reaches the retail stage undamaged. For more details about the methodology of Food Loss Index, refer to annex 1.

1.2.3.4. Prevalence of Undernourishment

According to FAO, undernourishment is defined as the «situation in which an individual's usual food intake is insufficient to provide the minimum dietary energy intake necessary for a normal, healthy and active life". The Prevalence of Undernourishment (PoU) is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life. It is expressed as a percentage of the population that is undernourished or food deprived. The undernourished or food deprived are those individuals whose food intake falls below the minimum level of dietary energy requirements.

The PoU is an indicator used for monitoring progress towards the second target of the SDGs, which stated as" By 2030, eliminate hunger and make so that everyone, especially the poor and people in vulnerable situations, including taken infants, have access throughout the year to a healthy, nutritious diet and sufficient". It is useful in identifying national and global trends in population-level undernourishment. The PoU is also used to estimate the average per capita amount of additional energy (Kcal) that undernourished individuals need to consume to reach their average dietary energy requirement. The computation of PoU is based on the calculation of four key parameters for a country: the average amount of habitual daily per capita food consumption (the food available for human consumption is used as a proxy), the level of inequality in access to food, the asymmetry in the distribution of habitual per capita consumption and the minimum dietary energy requirements of the population under analysis. This indicator is defined within a probability distribution framework as follows:

$$P(U) = \text{P(x<MDER)} = \int f(x|DEC, CV, Skew)\, dx$$

Where:

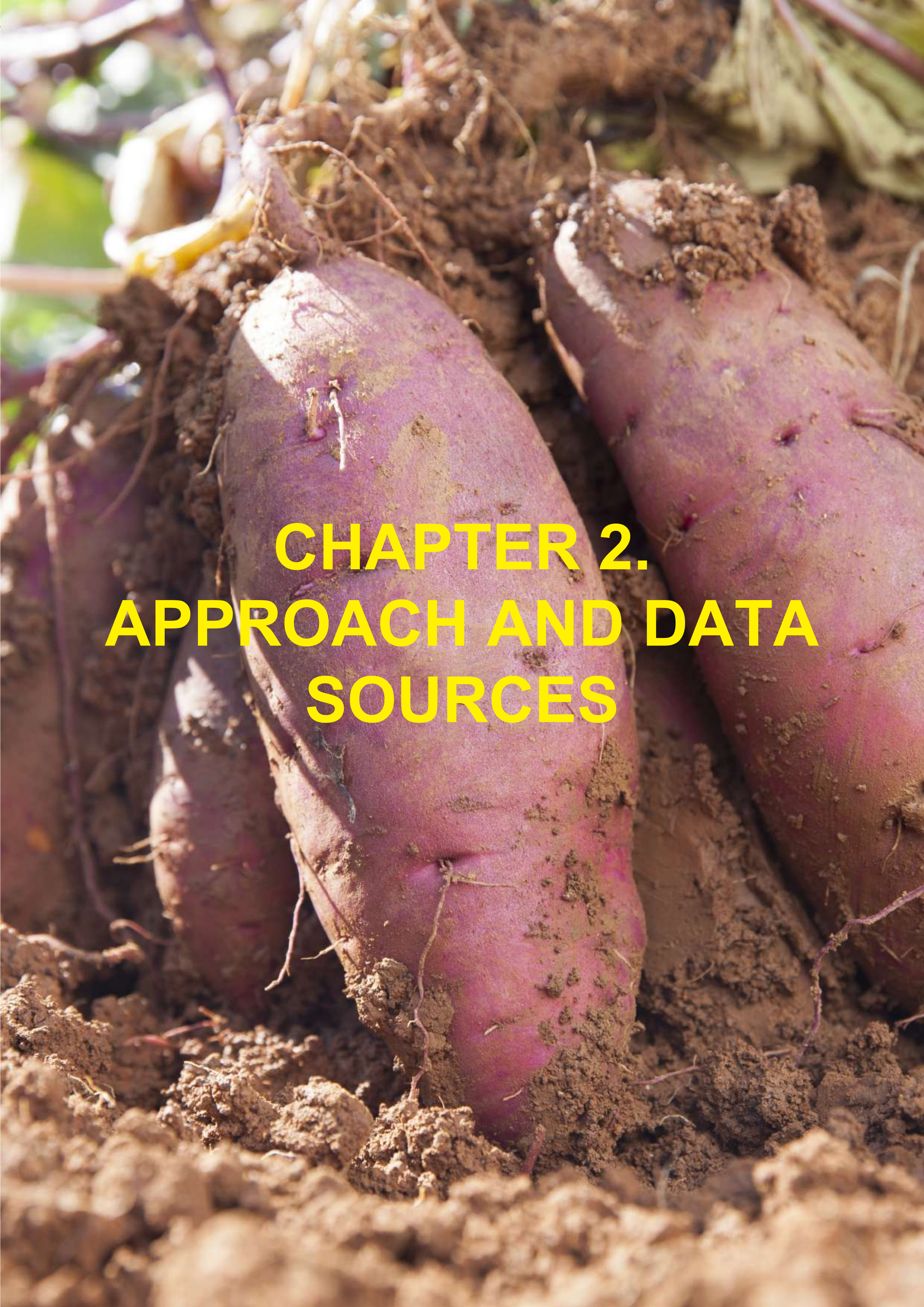
- P(U) is the proportion of undernourished in total population;
- DEC is the average of the distribution of habitual daily per capita dietary energy consumption in the population;
- CV is the coefficient of variation of the distribution of habitual daily per capita dietary energy consumption in the population;
- Skewness is the skewness that characterize the asymmetry of the distribution of habitual daily per capita dietary energy consumption in the population; and
- MDER is the minimum dietary energy requirements of the population.

This indicator ranges from 0% (no undernourished population) to 100% (the entire population is undernourished). Within a given country, a higher value of this indicator means that more people suffer from undernourishment (food deprivation). The following undernourishment categories/Cut off points are the most commonly used:

- 14.9% Moderately low
- 15% - >24.9% Moderately high
- 25% - >34.9% High
- 35% and over Very high

Further details about the methodology of PoU can be found in annex 2.

CHAPTER 2. APPROACH AND DATA SOURCES



This Chapter highlights detailed approach used in setting up a robust and sustainable FBS compilation system, and compiling effectively the first FBS for Rwanda. The methodology used for compiling FBS is based on guidelines for the compilation of FBS developed in the framework of the implementation of the Global Strategy for Improving Agricultural and Rural Statistics (GSARS). Also presented are highlights of the key activities undertaken by the national FBS Team to compile the Rwanda FBS. In Rwanda, the FBS is compiled by the NISR through the TWG_FBS composed of members from NISR and MINAGRI. The first FBS for the country was developed under the guidance of the AfDB/COMESA International Consultant and the Principal Agriculture Statistician from AfDB supported by a National Consultant (hired by AfDB).

2.1. Approach

This Section highlights the activities undertaken to compile the Rwanda FBS from the development of the roadmap to guide the process, putting up a FBS Technical Working Group (TWG_FBS), conducting the national training workshops facilitated by the AfDB/COMESA International Consultant, to compiling SUAs, and generating, validating, and analyzing FBS results.

2.1.1. Data collection and preparation of FBS compilation Tool

The most important part of the required data for SUA/FBS compilation are available within NISR and Ministry of Agriculture and Animal Resources (MINAGRI). The crops production data is obtained from Annual Agriculture Surveys conducted by NISR and MINAGRI to estimate the production, area harvested and yield for main commodities. Trade Statistics (formal) are collected daily through the routine activities of customs management of entry and exit of goods on the national territory while the informal trade statistics are collected and analysed monthly by the National Bank of Rwanda (NBR) in collaboration with NISR and other institutions. NISR as the custodian of official statistics has the responsibility to analyse and ensure the quality of these data which are also key for the FBS compilation.

a) Data collection

Prior to the national training workshop, NISR has gathered a number of necessary basic data for the compilation of FBS. Among the basic data collected includes the production, trade, and consumption of main food items. During the workshop, working groups were formed based on members area of specialization and each group was assigned specific data to collect using structured FBS templates. Members were requested to document the data sources, used methodologies, and to identify any data gaps or inconsistencies. Also, to ensure that the process was coherent and transparent, members were requested to collaborate with all relevant key actors, including producers and users of the data. The data collected include but not limited:

Production data: The production component includes crops, livestock, and fisheries. The production data used in the FBS relates to quantities of the primary crop commodity of item that has produced within a specific period. The crop production is obtained from the Seasonal Agricultural Survey (SAS) conducted by the NISR following agricultural seasons while livestock and fishery production are obtained through the National Accounts production and Agriculture Household Survey conducted every three years by NISR. Data on processed commodities are obtained from National accounts.

Trade Data: This involves the quantities of crops, livestock and livestock products and fishery items that cross the domestic borders. Trade statistics (formal) are collected daily through the routine activities of customs management of entry and exit of goods on the national territory while the informal trade statistics are collected and analysed monthly by the National Bank of Rwanda (NBR) in collaboration with NISR and other institution. The classification used in trade statistics is Harmonized System (HS) and should be converted to Central Products Classification (CPC) in the framework of FBS compilation. The process of the mapping between HS codes to the CPC ones is described in the Box 1 below.

Box 1: Trade data mapping process

According to the new standard/international methodology of Food Balance Sheets, the CPC codes should be used for all the components, including imports and exports. However, trade data statistics are codified into HS. There is therefore a need to convert (map) HS codes from trade statistics to CPC codes. As for now and for FBS compilation purposes, three versions of HS are used by the countries: HS 2007, HS 2012 and HS 2017. The correspondence table that exists between HS and CPC is the one mapping HS 2012 to CPC. For that, it appears obviously the necessity to do the mapping of the other two of HS versions (HS 2007 and HS 2017) to HS 2012, before using the correspondence table HS 2012 to CPC. When it comes to the mapping of HS 2007 and HS 2017 to HS 2012, we have different types relations are as follows:

From HS 2007 to HS 2012: (i) One-to-one, (ii) Many-to-one; and (iii) One-to-many.
From HS 2017 to HS 2012: (i) One-to-one and (ii) Many-to-one.

The relations one-to-one and many-to-one are not problematic because each element of the first set is paired with one element of the second set. It means that no code in the first set is split into many (2 or more) codes in the second set. Consequently, the mapping of HS 2017 to HS 2012 is handled easily. Concerning the mapping of HS 2007 to HS 2012, the two first relations (one-to-one and many-to-one) are also handled easily. The issue is when one code of the first set (HS 2007) is split into many (2 or more) codes in the second set (HS 2012), as it is exactly for the relation one-to-many. A Tool named “Trade Data Mapping Tool (TDMT)” has been designed by African Development Bank that comes as a value added to sort out the arising issue.

In the case of the relation one-to-many (HS 2007 to 2012), this Tool can automatically estimate the new quantity of each product (aggregated in HS 2007 but split in HS 2012) using the proportional allocation method. The advantage is that the year from which the country has started using HS 2012 is automatically detected by the Tool, based on the uploaded data and that is another value added brought by the Trade Data Mapping Tool.

Once we are done with the mapping of HS (2007 or HS 2017) to HS 2012, the process of the mapping HS 2012 to CPC starts, which comprises of three relations: (i) One-to-one, (ii) Many-to-one; and (iii) One-to-many.

Similarly, to the mapping between the different versions of HS (HS 2007 or HS 2017 to CPC), the two first relations: one-to-one and many-to-one are not problematic. For the relation one-to-many where one code of HS 2012 is paired to more than one in CPC, since the corresponding codes belong to the same group of commodities, the selection of one of them doesn’t affect the quality of FBS. Therefore, the Tool can automatically select one of the codes in the second set (CPC). However, to make it more flexible for the countries, a manual option is built in the Tool to allow the users to select the commodities in the second set (CPC) according to their knowledge of the specific of their respective countries and as per their expertise.

Gross domestic product (GDP) is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific period. As a broad measure of overall domestic production, it functions as a comprehensive scorecard of a given country's economic health. GDP system collects regular information related on production of corps, fishery, livestock, and some processed food.

Feed ratios: Commodity feed ratios are obtained through the national accounts production.

Seed rates: Seed rates (Kg/ha) were computed using SAS raw data. Based on the quantity of seed sown per unit area (application rate), we calculated the average seed rate for paddy rice, Irish potatoes, wheat, soybean, beans, maize, millet, sorghum, peas and groundnuts. To compute the quantity of seeds sown, we multiplied harvested area and seed rates. Besides, standards factors were used for hen eggs.

Table 8: Seed ratios used

CPC	Commodity	Seed rate (Kg/ha)
0113	Paddy rice	39.9
01510	Irish	1,246.3
0111	Wheat	129.2
0141	Soybean	84.8
01701	Bean	104.1
0112	Maize	32.4
0118	Millet	29.7
0114	Sorghum	29.2
01705	Pea	78.7
0142	Groundnuts	73.2

The quantity of eggs used for hatching is considered as seed according to the definition of seed. A standard factor from Technical Conversion Factors document is used for hen eggs which corresponds to 4% of the production of eggs.

Extraction rates and nutrient factors: The extraction rates and nutrient factors used were standards obtained from technical conversion factors document.

Loss ratios: The available data for loss ratios were paddy rice, maize and beans. For the rest of other commodities, standard ratios from technical factors were used.

Population: The data used were available at NISR from the population and housing census data. It was used to estimate per capita supply.

Anthropometric: The data used were obtained from the Rwanda Demographic and Health Survey and were used to compute the prevalence of undernourishment.

b) Preparation of FBS compilation Tool

In order to facilitate the development of the FBS across countries, a FBS compilation Tool was developed based on standard/international guidelines for FBS compilation. The African Development Bank has customized the Tool to adapt it to the context and specificity of Rwanda.

This FBS compilation Tool does not take into account the fishery products, and it does not even handle the mapping of trade data which has to be done outside the Tool. The trade mapping exercise is done using another Tool called Trade Data Mapping Tool, also developed by the AfDB which works as a bridge table between Harmonized System (HS) codes and Central Products Classification (CPC) codes. In order to address the mentioned issues that are not handled by the Tool, the Technical Working Group performed the following activities:

- Compilation of fishery SUA data and generation of FBS results for the same using Excel;
- Mapping HS codes to CPC using Trade Data Mapping Tool.

2.1.2. Development of Roadmap to establish FBS compilation system

In the framework of continuous improving its capacity of compilation and analysis of agriculture statistics, NISR has requested AfDB for a Technical Assistance to develop the Rwanda FBS. Based on this request, the AfDB organized an initial mission in Kigali, from 22nd to 26th August 2022, to assist in the development of a roadmap for the establishment of a robust FBS compilation system. The mission was composed of Mr. Vincent NGENDAKUMANA, Principal Agriculture Statistician, AfDB, and Mr. Salou BANDE, International Consultant of AfDB/ COMESA.

The Mission objective was to establish a working framework and a system of compiling the FBS in Rwanda. During this exercise the following activities have been achieved:

i. Enhance the required institutional framework for compiling the FBS through formal establishment of TWG, identification of basic data producers/sources and users of Supply Utilization Accounts (SUAs) and FBS, hence building a foundation for a sustainable and robust FBS compilation system.
ii. Setting up a realistic schedule of activities and needed resources to successfully implement it;
iii. Conducting a national training workshop on SUA/FBS compilation; and
iv. Support the compilation of SUA/FBS for 2017-2021 using the New Guidelines/Tool.

2.1.3. Setting up the institutional framework (TWG)

In order to establish a formal institutional framework for the FBS compilation in Rwanda, a dedicated Technical Working Group for FBS (TWG_FBS) was formed, (See figure 1). The TWG_FBS's main objective is to ensure the technical coordination of the collection and compilation of basic data and parameters for SUAs, as well as the preparation, validation, analysis and publication of FBS results. Specifically, it advises on the type of data to be collected and review the intermediate deliverables, such as SUA tables, technical parameters (e.g., technical conversion factors, nutritive factors, etc.), calculation methods and analyses of indicators. The TWG_FBS coordinates the FBS compilation and the sharing of information across different participating institutions as well as setting the timelines and deliverables.

All subsectors of agriculture, which could be considered as "Thematic TWG" and include key relevant producers and users of FBS statistics are represented in this TWG_FBS.

To ensure the sustainability of the FBS compilation system in Rwanda, it was advised to have a Core Team composed of two persons from Agricultural and Environmental Statistics Team of NISR who are responsible for daily compilation of SUA/FBS basic data and generating FBS results. One of them is the first responsible person of the system, while the second one is his/her alternate.

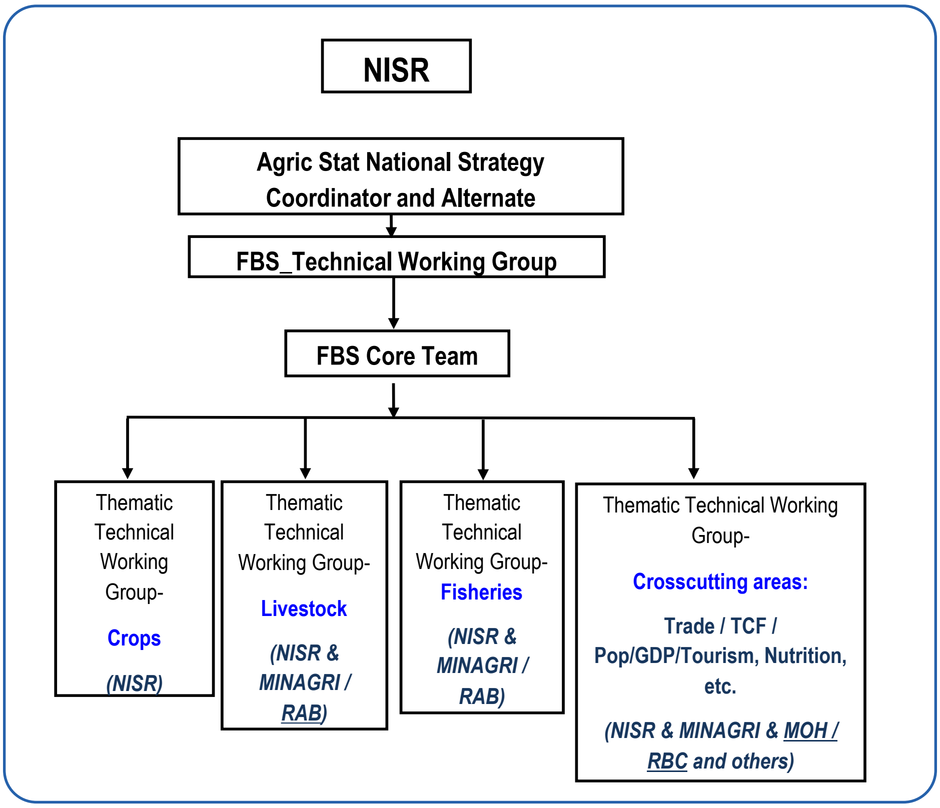
NISR ensures the coordination of all involved activities and the sharing of information across the different participating institutions, including the final FBS Report to be approved.

The FBS_TWG is composed of the following:

- National Strategy Coordinator for Agricultural Statistics and Alternate;
- The FBS Core Team;
- Staff from Agriculture and Environment Statistics Team of NISR; and
- Staff from key producers and users of FBS statistics. The list of Technical Working Group Members is presented in annex 5.

The Technical Working Group shall operate under the National Strategy Coordinator for Agricultural Statistics, who reports to the DG of NISR. The approval of FBS results is of the responsibility of the Management of the Institutions represented in the FBS_TWG.

Figure 2: Institutional structure for FBS compilation system in Rwanda



2.1.4. National training workshop

A workshop of two weeks involving national experts from FBS_TWG was conducted and facilitated by the International AfDB/COMESA consultant. The first week was dedicated to the training on the FBS standard guidelines, with illustration of practical exercises to equip participants with better understanding of the SUA/FBS compilation method. Participants, members of the FBS_TWG, were also trained on the use of the FBS Compilation Tool developed at this end. A second week was devoted to the training on the concept of trade data mapping and processing.

A practical session on the use of the Trade Data Mapping Tool was organised, and participants used the real trade data for the mapping of 2017-2021 HS codes to CPC codes. Furthermore, during the second week of training, participants were capacitated on the elaboration of the related SDGs indicators, namely, the Prevalence of Undernourishment and Food Loss Index. The FBS formatting Tool, also developed by AfDB and not incorporated in the FBS compilation Tool, that allows to format the FBS results to the standard format was also presented to the participant for use.

2.1.5. Complementary data collection

On top of data collected, other types of data such as population, national accounts (See Box 2 below for the definition) especially the supply and use table, commodity prices, anthropometric data are available within NISR. Data obtained includes food consumption ratios, feed ratios, processed commodities, GDP, stock variation and fishery data. However, several gaps in terms of data availability were identified and the FBS_TWG addressed them.

These data are, but not limited to:

i. Processed commodities for crops and livestock;
ii. Stocks variations;
iii. Technical Conversion Factors (Nutritional data, extraction rates, ratios (for feed, seed)); etc.

Box 2: Definition of National Accounts

National Accounts through the Supply and Use Tables and the Gross Domestic Product: National accounts is defined as a measure of macroeconomic categories of production and purchase in a given economy or nation while the Supply and Use Table describes how goods and services become available and are used in an economy during a certain period of time. Products are either produced in the domestic industry or imported. The Use Table shows how goods and services are used in the economy during a certain period. The SUT provides different ratios on derived products and inputs used to produce food items.

2.1.6. Compilation of SUA basic data and generation of FBS preliminary results

The activity related to SUA/FBS compilation and generating FBS preliminary results was implemented immediately after the two-weeks of training. The initial compilation was facilitated by the International AfDB/COMESA consultant. The FBS Core Team was provided with the necessary technical skills to effectively compile SUAs, and produce FBS results and related SDGs indicators. During the national training workshop, working groups were established and tasks were defined for each group.

The groups worked on data quality check, estimations and imputations, and compilation and generation of FBS preliminary results. Afterwards, the FBS Core Team, with the support of the National and International Consultants, undertook data review to identify discrepancies and address them.

2.1.7. Review and Validation of FBS preliminary results

After production of FBS primary results, the team constantly worked remotely with the International Consultant after his mission to check the inconsistencies and addressing them. Additionally, the FBS Core Team proceeded with consultations for further review and technical validation within Thematic Technical Working Groups. For each thematic cluster, the Core Team held the consultations envisaged to seek for the technical validation of preliminary results. The consultations enabled the Core Team to revise results and re-submitted to the NISR Management for a final approval.

2.1.8. Preparation of the report, editing and graphic design

The report was prepared by the National Team with the support of National and international consultants. As soon as the preliminary results were produced, the Team started drafting some sections of the report (Introduction, concepts and definitions, methodology), by waiting the final results and this is in the view to fastrack the process of the preparation of the report. The Statistics Department of African Development Bank, through the Principal Agriculture Statistician contributed to reviewing and editing the document. The raised observations were implemented and addressed by the National Team, with the contribution of the consultants (national and international) and thereafter the report was cleared by the Management of AfDB Statistics Department. In order to ensure a better presentation of the report, AfDB contributed to its professional formatting (graphic design). The national Team (including the national consultant), the international consultant as well as the Principal Agriculture Statistician (AfDB) helped to improving the report though the proof reading, until the production of the final (publishable) version of report.

2.1.9. Management and archiving of SUA/ FBS database

The FBS database (FBS Compilation Tool) must be carefully secured for future use. NISR is the responsible for hosting this database. Whenever the database is updated, a copy should be saved and archived. After each annual compilation cycle, once the final results are validated, the database should be frozen and a copy saved on the same machine, but under a different name, for any future reference, and then duplicated on NISR database server. When doing so, it will be easy the FBS Team to find the latest version at any time for the compilation during a new cycle.

2.2. Data sources

The surveys, census and administrative records are the main sources of data used as described hereunder:

Surveys and Census

- Crop production, Seeds and seed rates (SAS);
- Anthropometric data (DHS);
- Population data (RHPC); and
- Commodity prices (CPI).

National accounts

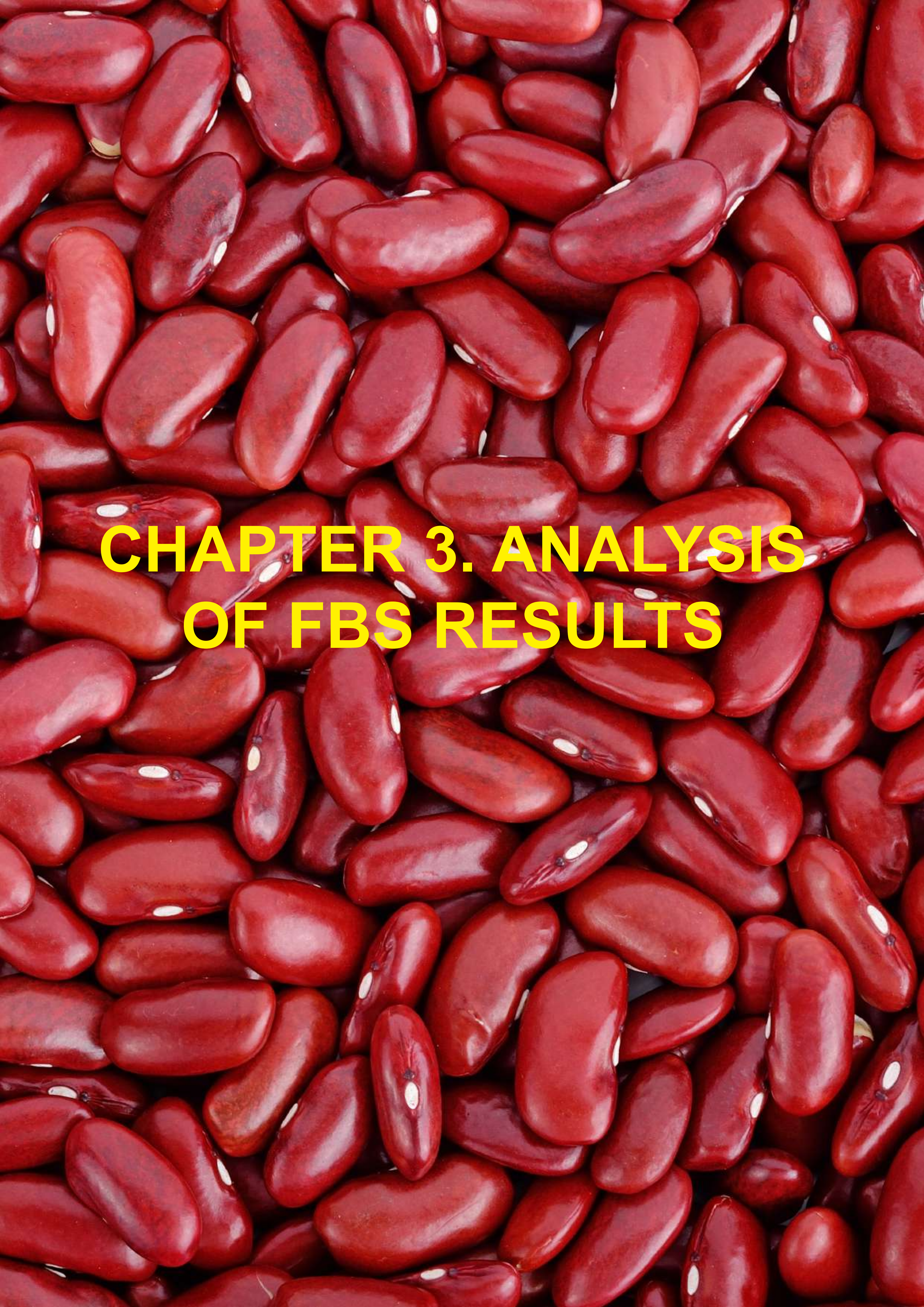
- Processed commodities;
- Livestock production;
- Stock variation;
- Food ratios;
- Feed and feed ratios;
- Fisheries; and
- GDP.

Administrative records

- Trade data (imports and exports);
- Livestock numbers (MINAGRI); and
- Loss and Loss ratios (MINAGRI).

FAO

- Technical conversion factors (Seed rates, Extraction rate).



CHAPTER 3. ANALYSIS OF FBS RESULTS

Generated FBS results are discussed in this chapter. The focus is put on food supply in terms of kilogram per capita per year, per capita and per day dietary energy supply, supply of proteins and fats. A comparison of the quantities of domestic supply with that produced domestically or imported is made to indicate whether Rwanda is self-sufficient or relies on imports to feed itself. Furthermore, the Chapter discusses the Food Loss Index, which is used to measure and monitor food losses throughout the food supply system in order to improve efficiency against food losses, as well as the Prevalence of Undernourishment estimation. Finally, the chapter concludes by comparing the Rwanda FBS against the FAOSTAT data for Rwanda.

3.1. Food Supply per capita per year (Kg)

The FBS results provide information on available food supplies for human consumption. This information is used to estimate the average amount of food consumed (Kg) by an individual over the course of a year. Data on per capita food supplies are useful for forecasting population food demand.

3.1.1. Vegetal products

As per Table 9 below, the results indicate that food availability from starchy roots was the highest among other vegetal groups during 2017-2021 period, with an estimated 256.3 Kg per capita per year. Fruits averaged 82.8 kg/cap/year, cereals 78.2kg/cap/year, vegetables 45.9 kg/cap/year, and alcohol 41.9 kg/cap/year. The analysis shows that the food supply in Rwanda did not change significantly over the review period (2017-2021) for all groups of vegetal products considered.

Table 9: Food supply per capita per year (Kg), per group of vegetal products

Vegetal Groups	2017	2018	2019	2020	2021	Average
Starchy roots	258.3	256.7	258.5	252.7	255.4	256.3
Fruits (excluding wine)	77.5	78	80.8	87.3	90.6	82.8
Cereals (excl. beer)	80.6	79.4	74.3	80.4	76.3	78.2
Vegetables	43.4	46.2	44.2	47.6	48	45.9
Alcoholic beverages	42.9	41.7	39.4	41.9	43.5	41.9
Pulses	31.8	34.3	31.8	29.9	32.3	32
Sugar & Sweeteners	9.8	9.2	9.2	10.4	12.5	10.2
Stimulants	8.3	8.7	9	9.4	9.8	9
Oil crops	4.6	5.1	6	6.2	6	5.6
Vegetable oils	4.8	5.3	5.5	5.2	5.2	5.2
Sugar crops	0.9	0.9	0.9	0.9	0.9	0.9
Spices	0.3	0.3	0.7	0.6	1.1	0.6

As per Table 10 below, sweet potatoes, cassava, and Irish potatoes, as well as their products, account for 94 percent of starchy roots in terms of individual crop contributions to food availability in this group. Moreover, plantains and bananas[4] contribute the most to food supply for the fruits group, with an average 61.5 kg and 19.8 kg per capita per year, respectively. Furthermore, maize & products, rice, and sorghum and products are more readily available cereal foods than others with 86 percent contribution within the group, with an average of 35.4 kg, 19.4 kg, and 12.1 kg per capita per year, respectively.

Table 10: Contribution of main commodities to food supply

Main vegetal commodities	Per year Food (kgs per capita per year)						
	2017	2018	2019	2020	2021	Average	% Share
Cereals (excl. beer)	**80.6**	**79.4**	**74.3**	**80.4**	**76.3**	**78.2**	**100**
Maize and products	36.9	35.9	34.1	36.5	33.7	35.4	45.3
Rice & prod (milled equivalent)	18.7	19.1	17.4	21.4	20.1	19.4	24.8
Sorghum and products	12	12.8	11.5	11.7	12.3	12.1	15.5
Wheat and products	12.5	10.9	10.8	10.4	9.8	10.9	13.9
Starchy roots	**258.3**	**256.7**	**258.5**	**252.7**	**255.4**	**256.3**	**100**
Sweet potatoes	92.2	92.2	94.5	94.6	96.2	93.9	36.6
Cassava and products	88.3	89.4	87.5	90.4	88.8	88.9	34.7
Potatoes and products	60.9	62.6	64.1	54.3	56.5	59.7	23.3
Sugar & Sweeteners	**9.8**	**9.2**	**9.2**	**10.4**	**12.5**	**10.2**	**100**
Sugar & Prod. (raw equivalent)	9.7	9.1	9.1	10.3	12.4	10.1	98.7
Pulses	**31.8**	**34.3**	**31.8**	**29.9**	**32.3**	**32**	**100**
Beans, dry & products	30.8	33.1	30.7	28.9	31.2	30.9	96.5
Fruits (Excluding Wine)	**77.5**	**78**	**80.8**	**87.3**	**90.6**	**82.8**	**100**
Plantains	56.3	57.2	60.1	65.6	68.1	61.5	74.2
Bananas	19.6	19.2	19.2	20.3	20.9	19.8	23.9
Vegetable oils	4.8	5.3	5.5	5.2	5.2	5.2	100
Palm Oil	3.9	4.2	4.5	4.3	4.3	4.2	80.8

3.1.2. Animal products

In terms of animal products, Table 11 shows that milk & products (excluding butter) availability for human consumption in Rwanda is of an annual per capita average of 7.5 Kg. While meat & products (especially bovine products accounting for 74 percent of the total meat) and fish and sea foods averaged 3.3 Kg and 1.8 Kg per year food (kgs per capita per year), respectively. The analysis shows that the trend in annual milk and meat availability per individual remained stable throughout the period under review.

[4] In Rwanda, there are three main categories for banana, banana for cooking, banana for beer and dessert banana. Banana for cooking is reported under plantain and banana for beer and dessert banana are both reported under banana. Then quantity of banana for beer is processed into beer and the dessert banana is eaten as raw.

Table 11: Contribution of group of animal products in terms of food supply per capita per year (Kg)

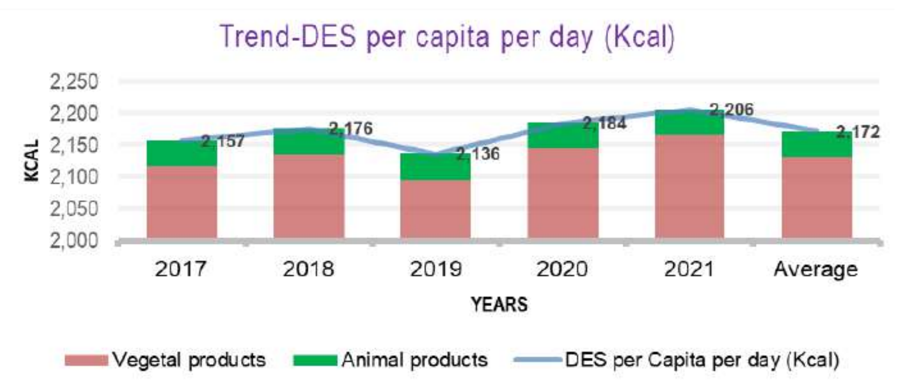
Main animal groups	2017	2018	2019	2020	2021	Average
Meat	**3.4**	**3.5**	**3.4**	**3.3**	**3.2**	**3.3**
Meat & Products, Bovine	2.7	2.7	2.5	2.2	2.1	2.5
Meat & Prod, Sheep & Goat	0.3	0.4	0.4	0.4	0.4	0.4
Meat & Products, Pig	0.2	0.1	0.1	0.3	0.3	0.2
Meat & Products, Poultry	0.2	0.2	0.3	0.3	0.3	0.2
Meat & Products, Other Anim.	0.1	0.1	0.1	0.1	0.1	0.1
Offals	**0.6**	**0.6**	**0.6**	**0.5**	**0.5**	**0.6**
Offals, Edible	0.6	0.6	0.6	0.5	0.5	0.6
Animal fats	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Fats, Animals, Raw	0.1	0.1	0.1	0.1	0.1	0.1
Milk - Excluding Butter	**7.2**	**6.8**	**7.8**	**8.1**	**7.9**	**7.5**
Milk & Prod (Excluding Butter)	7.2	6.8	7.8	8.1	7.9	7.5
Eggs	**0.4**	**0.4**	**0.3**	**0.4**	**0.4**	**0.4**
Eggs and products	0.4	0.4	0.3	0.4	0.4	0.4
Fish & sea food	**2.1**	**2**	**1.8**	**1.5**	**1.5**	**1.8**

3.2. Dietary Energy Supply (DES) per capita per day (Kcal)

The Dietary Energy Supply (Kcal/capita/day) is a national indicator that serves as an estimate of the amount of calories available for human consumption from foods. It can be used to determine whether a country's food supply contains enough dietary energy to meet the needs of the entire population, and whether measures should be taken to increase the amount of dietary energy available to the population.

According to the FBS results (See Figure 3 below), calorific supply increased slightly from 2,157 Kcal/cap/day in 2017 to 2,206 Kcal/cap/day in 2021 and decreased to 2,136 Kcal/cap/day in 2019. The decrease in 2019 DES is associated with drop in domestic supply (production + net trade – stock variation) mainly on cereals (maize, rice and sorghum) and beans. This decrease in domestic supply is driven by drop in imports of maize and products, rice and products, sorghum and products and beans, as well as increase in beans exports. In fact, maize and products imports decreased by 45 percent from 146,229 metric tons in 2018 to 80,687 metric tons in 2019. Rice and products saw a similar decline, falling from 213,159 metric tons in 2018 to 173,452 metric tons in 2019. Imports of sorghum and products fell from 48,792 metric tons in 2018 to 28,279 metric tons in 2019. Beans imports fell from 12,648 metric tons in 2018 to 8,282 metric tons in 2019. Bean exports increased significantly in 2019 from 24,470 metric tons in 2018 to 37,335 metric tons.

Figure 3: Rwanda Dietary Energy Supply per Capita per Day (Kcal) 2017-2021



3.2.1. DES from vegetal products

The results indicate that vegetal products contributed 98 percent of the total DES during the review period. Starchy roots, cereals and pulses are the highest contributors, with 75 percent contribution to vegetal products DES (See Table 12 below). Other relatively important groups of vegetal products include fruits, vegetable and oils crops, as well as sugar and sweeteners, which account for 18 percent of all vegetal products considered.

Table 12: Contribution of vegetal groups to DES per capita per day (Kcal) from vegetal products

Main vegetal groups	2017	2018	2019	2020	2021	Average	% Share
Vegetal products	**2,115.8**	**2,135.0**	**2,095.2**	**2,144.8**	**2,166.2**	**2,131.4**	**100.0**
Starchy roots	655.0	650.0	653.0	646.0	651.0	651.0	31.0
Cereals (excl. beer)	666.0	655.0	613.0	660.0	627.0	644.2	30.0
Pulses	291.8	315.0	292.2	274.8	297.2	294.2	14.0
Fruits (Excluding Wine)	150.0	150.0	158.0	170.0	176.0	160.8	8.0
Vegetable oils	117.0	127.0	133.0	127.0	125.0	125.8	6.0
Sugar & Sweeteners	93.0	87.0	88.0	101.0	121.0	98.0	5.0
Oil crops	44.0	49.0	57.0	60.0	57.0	53.4	3.0
Alcoholic beverages	53.0	52.0	49.0	52.0	54.0	52.0	2.0
Vegetables	25.0	28.0	28.0	30.0	30.0	28.2	1.0
Stimulants	9.0	10.0	10.0	10.0	10.0	9.8	0.0
Spices	3.0	3.0	5.0	5.0	9.0	5.0	0.0
Sugar crops	1.0	1.0	1.0	1.0	1.0	1.0	0.0

Table 13 depicts the ranking of the top DES contributors in terms of individual vegetal commodities. With an estimated annual average of 321 Kcal/person/day, maize and products came in first, followed by beans and products at 283 Kcal/person/day, cassava and products at 255 Kcal/person, and sweet potatoes at 247 Kcal/person/day. Rice and products, plantains (cooking banana), potatoes, sorghum, and palm oil and products were also among the commodities that contributed the most to the DES of vegetal products.

Table 13: Contribution of vegetal commodities to DES per capita per day (Kcal) from vegetal products

Main vegetal commodities	2017	2018	2019	2020	2021	Average	% Share
Maize and products	335.0	326.0	309.0	330.0	306.0	321.2	15.0
Beans, Dry & Products	282.8	304.0	281.2	264.9	286.2	283.8	13.0
Cassava and products	253.0	257.0	251.0	260.0	255.0	255.2	12.0
Sweet potatoes	243.0	242.0	248.0	249.0	253.0	247.0	12.0
Plantains (Cooking banana)	116.0	117.0	124.0	135.0	140.0	126.4	6.0
Rice & Prod (Milled Equivalent)	124.0	127.0	116.0	143.0	134.0	128.8	6.0
Sugar & Prod. (raw equivalent)	92.0	86.0	87.0	100.0	120.0	97.0	5.0
Sorghum and products	108.0	114.0	103.0	105.0	111.0	108.2	5.0
Potatoes and products	119.0	122.0	125.0	106.0	110.0	116.4	5.0
Palm Oil	94.0	103.0	108.0	104.0	103.0	102.4	5.0
Wheat and products	94.0	82.0	81.0	78.0	73.0	81.6	4.0

According to the findings, the dietary energy supply of beans and Irish potatoes decreased in 2020. The decrease in local production of both crops for 2020 explains this. In fact, beans production decreased from 484,251 metric tons in 2019 to 438,737 metric tons in 2020, while Irish potatoes fell from 973,408 metric tons in 2019 to 858,522 metric tons in 2020. Similarly, the DES for sugar fell in 2018 and 2019 due to a decrease in imports in 2018 and an increase in sugar exports in 2019. Sugar imports were low in 2018 (113,660 metric tons) compared to 168,588 metric tons in 2017, while sugar exports increased from 18,079 metric tons in 2018 to 43,021 metric tons in 2019. In contrast, the year 2021 had a higher DES of sugar, which is attributed to an increase in sugar imports as a result of the rise of food processing factories, which imported more quantities. Sugar imports increased from 142,567 metric tons in 2020 to 190,024 metric tons in 2021.

3.2.2. DES from animal products

Table 14 depicts the contribution of animal products to calorie supply. Although the contribution of animal commodities varies, the overall contribution of animal products is negligible. Meat and milk products contributed the most per capita energy, with annual averages of 17.2 and 12.8 kcal per capita per day, respectively. This is equivalent to 75 percent both combined to animal products DES. Fish and seafood, as well as eggs and products, contributed less to the DES of animal products, with 5.8 and 1.0 Kcal per capita and per day, respectively, which makes a contribution of 16 percent to animal products DES. Meat from cattle is the main source of the animal products DES, accounting for more than 70% of total meat contribution, with an average of 12.6 Kcal/capita/day.

Table 14: Contribution of animal product groups to per capita energy (Kcal) from anima products

	2017	2018	2019	2020	2021	Average	% Share-Groups	%Share-Commodities
Animal prod.	**40.8**	**41.3**	**40.9**	**39.2**	**39.9**	**40.4**	**100.0**	
Meat	**18.0**	**18.0**	**17.0**	**16.0**	**17.0**	**17.2**	**42.6**	
Meat & Products, Bovine	14.0	14.0	13.0	11.0	11.0	12.6		73.3
Meat & Prod, Sheep & Goat	1.0	2.0	1.0	1.0	2.0	1.4		8.1
Meat & Products, Pig	2.0	1.0	2.0	3.0	3.0	2.2		12.8
Meat & Products, Poultry	1.0	1.0	1.0	1.0	1.0	1.0		5.8
Offals	**2.0**	**2.0**	**2.0**	**1.0**	**1.0**	**1.6**	**4.0**	
Offals, Edible	2.0	2.0	2.0	1.0	1.0	1.6		100.0
Animal fats	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**5.0**	
Fats, Animals, Raw	2.0	2.0	2.0	2.0	2.0	2.0		100.0
Milk - Excluding Butter	11.0	12.0	13.0	14.0	14.0	12.8	31.7	
Milk & Prod (Excluding Butter)	11.0	12.0	13.0	14.0	14.0	12.8		100.0
Eggs	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**2.5**	
Eggs and products	1.0	1.0	1.0	1.0	1.0	1.0		
Fish & sea food	**6.8**	**6.3**	**5.9**	**5.2**	**4.9**	**5.8**	**14.4**	
Fish	6.8	6.3	5.9	5.2	4.9	5.8		100.0

3.3. Daily per capita proteins (grams)

Daily per capita proteins available per person per day indicates the total amount of proteins in food available for consumption (See Figure 4 below). The overall per capita daily supply of proteins in Rwanda was found to be 55.5 grams on average in 2017-2021. The results spot a stable supply of proteins per capita per day throughout the review period. Evidently, vegetal products were the main source of proteins in Rwanda, with pulses and cereals providing more proteins than other vegetal groups. While the proteins supply from animal products is very low as a result of low quantity available for consumption in the country.

Figure 4: Per capita daily supply of proteins, Rwanda 2017-2021

3.3.1. Proteins from vegetal products

Table 15 depicts the various types of vegetal products and their respective contributions to Rwanda's total daily per capita proteins supply from vegetal group. Pulses contributed an average of 38% of total daily per capita proteins supply, equivalent to 20.1 grams, followed by cereals (excluding beer) which contribute 31% equivalent to 16.2 grams. This is in line with the fact that pulses (primarily beans) and cereals, particularly maize, sorghum, and rice are the most widely available vegetal products in the country, with high level of proteins content. Starchy roots (14%) and oil crops (7%) were the other relatively important vegetal products contributing to the total level of daily per capita proteins supply from the vegetal products group.

Table 15: Contribution of vegetal groups to supply of proteins (grams) from vegetal products

	2017	2018	2019	2020	2021	Average	% Share-Groups	%Share-Commodities
Vegetal products	**52.4**	**53.8**	**51.7**	**51.7**	**52.8**	**52.5**	**100.0**	
Cereals (excl. beer)	**17.0**	**16.0**	**15.0**	**17.0**	**16.0**	**16.2**	**30.9**	
Wheat and products	3.0	2.0	2.0	2.0	2.0	2.2		13.6
Maize and products	9.0	9.0	8.0	9.0	8.0	8.6		53.1
Sorghum and products	3.0	3.0	3.0	3.0	3.0	3.0		18.5
Rice & Prod (Milled Equivalent)	2.0	2.0	2.0	3.0	3.0	2.4		14.8
Starchy roots	**8.0**	**8.0**	**8.0**	**7.0**	**7.0**	**7.6**	**14.5**	
Potatoes and products	3.0	3.0	3.0	2.0	2.0	2.6		34.2
Cassava and products	1.0	1.0	1.0	1.0	1.0	1.0		13.2
Sweet potatoes	3.0	3.0	3.0	3.0	3.0	3.0		39.5
Roots & Tubers, Other & Prod.	1.0	1.0	1.0	1.0	1.0	1.0		13.2
Pulses	**19.4**	**21.8**	**19.7**	**18.7**	**20.8**	**20.1**	**38.2**	
Beans, Dry & Products	18.3	20.8	18.7	17.7	19.7	19.0		94.8
Peas, Dry & Products	1.0	1.0	1.0	1.0	1.0	1.0		5.2
Oil crops	**3.0**	**3.0**	**4.0**	**4.0**	**4.0**	**3.6**	**6.9**	

	2017	2018	2019	2020	2021	Average	% Share-Groups	%Share-Commodities
Soyabeans & Products	2.0	2.0	3.0	3.0	3.0	2.6		72.2
Groundnuts (Shelled Eq)	1.0	1.0	1.0	1.0	1.0	1.0		27.8
Vegetables	1.0	1.0	1.0	1.0	1.0	1.0	1.9	
Vegetables, Other & Prod.	1.0	1.0	1.0	1.0	1.0	1.0		100.0
Fruits (Excluding Wine)	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**3.8**	
Bananas	1.0	1.0	1.0	1.0	1.0	1.0		50.0
Plantains	1.0	1.0	1.0	1.0	1.0	1.0		50.0
Stimulants	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**3.8**	
Tea (including mate)	2.0	2.0	2.0	2.0	2.0	2.0		100.0

3.3.2. Proteins from animal products

Overall, the supply of proteins derived from animal products is extremely limited (See Table 16 below). The results show an equal contribution of animal products, with meat, milk, fish, and products each contributing 33 percent to proteins supply from animal products, equivalent to 1 gram each.

Table 16: Contribution of animal product groups to supply of proteins (grams) from animal products

	2017	2018	2019	2020	2021	Average	% Share-Groups	%Share-Commodities
Total animal products	**3.2**	**3.0**	**3.0**	**2.9**	**2.9**	**3.0**	**100.0**	
Meat	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**33.3**	
Meat & Products, Bovine	1.0	1.0	1.0	1.0	1.0	1.0		100.0
Milk - Excluding Butter	1.0	1.0	1.0	1.0	1.0	1.0	33.3	
Milk & Prod (Excluding Butter)	1.0	1.0	1.0	1.0	1.0	1.0		100.0
Fish & Sea food	**1.2**	**1.1**	**1.1**	**0.9**	**0.9**	**1.0**	**33.3**	
Fish	1.2	1.1	1.1	0.9	0.9	1.0		100.0

3.4. Daily per capita fats (grams)

Daily per capita fats expressed in grams indicates the total amount of fats available for consumption in foods. The results show a normal trend in supply of daily per capita fats throughout the review period. The average per capita daily fats in Rwanda are estimated at 27.6 grams (See Figure 5 below). Similarly, to proteins and calories, vegetal products are the dominant source of fats in Rwanda, with 92% share to the total level of daily per capita fats.

Figure 5: Per capita daily supply of fats, Rwanda 2017-2021

3.4.1. Fats from vegetal products

As per Table 17 below, the results reveal that vegetable oils and related products are the most important source of fats, especially palm oil which provided an average of 12 grams daily and per capita during the review period. Other relatively important groups contributing to the total level of the daily per capita fats supply include cereals (mainly maize with an average of 3.6 gr/cap/day).

Table 17: Contribution of vegetal groups to supply of fats (grams) from vegetal products.

	2017	2018	2019	2020	2021	Average	% Share-Groups	%Share-Commodities
Vegetal products	**24.0**	**25.0**	**25.1**	**27.0**	**26.0**	**25.4**	**100.0**	
Cereals (excl. beer)	**5.0**	**5.0**	**4.0**	**5.0**	**4.0**	**4.6**	**18.1**	
Maize and products	4.0	4.0	3.0	4.0	3.0	3.6		78.3
Sorghum and products	1.0	1.0	1.0	1.0	1.0	1.0		21.7
Starchy roots	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**3.9**	
Sweet potatoes	1.0	1.0	1.0	1.0	1.0	1.0		100.0
Pulses	**1.0**	**1.0**	**1.1**	**1.0**	**1.0**	**1.0**	**3.9**	
Beans, Dry & Products	1.0	1.0	1.1	1.0	1.0	1.0		100.0
Oil crops	**3.0**	**3.0**	**4.0**	**4.0**	**4.0**	**3.6**	**14.2**	
Soyabeans & Products	1.0	1.0	1.0	1.0	1.0	1.0		27.8
Groundnuts (Shelled Eq)	2.0	2.0	3.0	3.0	3.0	2.6		72.2
Vegetable oils	**14.0**	**15.0**	**15.0**	**15.0**	**15.0**	**14.8**	**58.3**	
Soyabean Oil	1.0	1.0	1.0	1.0	1.0	1.0		6.8
Sunflower seed Oil	2.0	2.0	2.0	2.0	2.0	2.0		13.5
Palm Oil	11.0	12.0	12.0	12.0	12.0	11.8		79.7
Fruits (Excluding Wine)	**-**	**-**	**-**	**1.0**	**1.0**	**0.4**	**1.6**	
Plantains	-	-	-	1.0	1.0	0.4		1.0

3.4.2. Fats from animal products

Animal products constituted a least source of fats in Rwanda over the period under review. The results in Table 18 below show an equal fats content for meat and milk, each contributing 1 gr/cap/day to total fats supply from animal products, in average; while that fish & sea food contributed only an average of 0.1 gr/cap/day. This could be explained by the low quantities available (animal products) for human consumption.

Table 18: Contribution of animal product groups to supply of fats (grams) from animal products, 2017-2021

Animal products	2017	2018	2019	2020	2021	Average	% Share	% Share-Commodities
Animal products	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**	**100.0**	
Meat	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**47.6**	
Meat & Products, Bovine	1.0	1.0	1.0	1.0	1.0	1.0		100.0
Milk - Excluding Butter	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**47.6**	
Milk & Prod (Excluding Butter)	1.0	1.0	1.0	1.0	1.0	1.0		100.0
Fish & sea food	**0.2**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**4.8**	
Fish	0.2	0.2	0.1	0.1	0.1	0.1		100.0

3.5. Self-Sufficiency Ratio (SSR)

The Self-Sufficiency Ratio (SSR) compares the magnitude of a country's agricultural production to its domestic utilization. SSR indicator measures the ability of food produced to meet the current food demand in the country. It is subject to the production and domestic supply:

$$SSR=\frac{P}{P+I-X-\Delta Stock}*100$$

Where:

SSR=Self-Sufficiency Ratio
P=Production
I=Import
X= Export
ΔStock =Stocks variation defined as closing stocks minus opening stocks

The analysis demonstrates Rwanda's ability (measured as a percentage) to cover its domestic supply through domestic production. Results show that, SSR is estimated to be 81.4 percent on average. SSR averaged 81.2 percent for vegetal products and 93.6 percent for animal products, meaning that on average, 81.4 percent of the domestic supply of vegetal product comes from production and the production from animal product represents 93.6 percent of the domestic supply of animal products. This could also mean that the most important part of food available for human consumption, which is one of the utilization components, comes from domestic production. In other words, the local production was insufficient to cover the domestic supply for the period under consideration (2017-2021), necessitating the use of imports and stocks, whereas animal product production was nearly sufficient to cover the domestic supply of that group.

Table 19: Self-Sufficiency Ratio (SSR) (%), Rwanda 2017-2021

Self-Sufficiency Ratio (%)	2017	2018	2019	2020	2021	Average
Grand Total	79.0	80.6	82.8	80.7	83.9	81.4
Vegetal products	78.8	80.4	82.6	80.5	83.7	81.2
Animal products	91.5	96.1	92.9	91.9	95.8	93.6

3.5.1. SSR for vegetal products

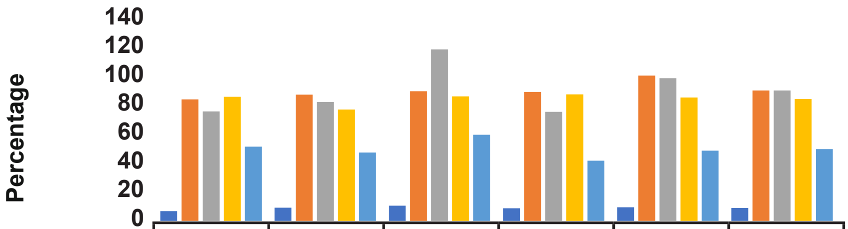
For the period under review 2017-2021, vegetal products such as stimulants and vegetables, were sufficiently supplied all the time, with each having SSR above 100% (See Table 20 below). Other relatively important SSR for vegetal products include sugar crops, starchy roots and pulses with SSR nearing or above 100% for the reference period. The results indicate that Rwanda is not self-sufficient with regard to cereals, spices, sugar and sweeteners, and oil crops, since their SSR is below 100% throughout the review period.

Table 20: Self-Sufficiency Ratio (%) for selected groups of vegetal products, 2017-2021

Group of vegetable products	2017	2018	2019	2020	2021
Cereals (excl. beer)	64.9	65.2	70.4	65.9	72.2
Starchy roots	95.9	99.8	102.1	102.9	104
Sugar crops	99.9	100.1	100.5	100.1	100.1
Sugar & Sweeteners	10.4	13.3	10.2	10	5.9
Pulses	103.2	102.4	106.2	99.5	101.7
Oil crops	72.8	66.2	54.5	47.4	52.8
Vegetables	100.2	100.3	100.8	100	101.9
Fruits (Excluding Wine)	99.4	99.3	99.6	99.8	99.6
Stimulants	145.8	152	148.7	139.9	137.6
Spices	36.5	31.1	73.5	50.6	54.8
Alcoholic beverages	94.0	95.6	98.5	98.3	97.8

Figure 6 indicates that wheat and rice recorded the lowest SSR, averaging 8.8 and 49.2 percent, respectively, during 2017-2021. This was because local production is relatively low compared to import flows for both crops.

Figure 6: Self-Sufficiency Ratio (%) for selected cereal products



	2017	2018	2019	2020	2021	Average
Wheat and products	6.6	9.0	10.4	8.6	9.3	8.8
Maize and products	83.2	86.5	88.9	88.4	99.6	89.3
Millet and products	75.0	81.5	117.5	74.7	97.7	89.3
Sorghum and products	85.0	76.3	85.3	86.7	84.5	83.6
Rise and Prod (Milled Equivalent)	50.9	46.8	59.0	41.2	48.1	49.2

3.5.2. SSR for animal products

Except for milk and fish & sea food, the SSR for animal products was greater than 100% over the entire reference period (See Table 21 below). This means that the domestic supply of meat, offal, animal fats, and eggs is limited to local production, implying that imports, exports, and stock variation are minimal. Rwanda, on the other hand, was not self-sufficient in milk and fish due to a high reliance on imports following significant quantities entering the country.

Table 21: Self Sufficiency Ratio (%) for selected groups of animal products, 2017-2021

Group of animal products	2017	2018	2019	2020	2021
Meat	103.5	105.4	104.6	101.4	102.5
Offals	100.0	100.0	100.0	101.2	101.0
Animal fats	100.0	100.0	100.0	100.0	101.9
Milk - Excluding Butter	74.3	84.2	81.3	86.4	91.8
Eggs	108.6	118.6	130.8	117.2	129.4
Fish & sea food	25.0	26.7	28.3	28.1	34.4

3.6. Import Dependency Ratio (IDR)

Import Dependency Ratio (IDR) indicates the extent to which a country's dependency on imports of agricultural commodities to meet domestic needs. A high ratio implies greater dependency on importation. The Import Dependency Ratio for Rwanda on vegetal and animal products for the period 2017-2021 is shown in Tables 22-24.

The results in Table 22 show that around 30% of food stuff were imported to meet domestic demand during the reference period 2017-2021. The FBS results indicate that IDR for vegetal and animal products averaged 32% and 17.9%, respectively, over the period 2013-2018. This implies that about 32% and 17.9% of domestic supply of vegetal products and animal products are procured from imports.

Table 22: Import Dependency Ratio (IDR) (%), Rwanda 2017-2021

Import Dependency Ratio (%)	2017	2018	2019	2020	2021	Average
Grand total	33.8	33.2	30.4	32.3	33	32.5
Vegetal products	34.1	33.4	30.6	32.5	33.2	32.8
Animal products	18.4	19.2	18.1	15.6	18.6	18.0

3.6.1. IDR for vegetal products

Although Rwanda local production of cereals is significant, the results (See Table 23 below) indicate that there is a considerable amount of imports on cereals, with the related IDR averaging 54.9 percent. Rice, maize, wheat and their products are the most imports commodities during the reviewed period. On the other hand, the IDR for starchy roots and pulses is very low (2.4 percent and 5.9 percent, respectively). This is an indication that their consumption depends on local production rather than imports. It can also be noted that the IDR for vegetable oils (184.3%), and sugar and sweeteners (123.5%) are above 100%. This is explained by the fact that the local production of these commodities is low, while the imports and re-exports are very high, mainly for palm oil and refined sugar.

Table 23: Import Dependency Ratio (%) for groups of vegetal products

	2017	2018	2019	2020	2021	Average
Cereals (excl. beer)	61.4	59.1	48.2	54.6	51.3	54.9
Starchy roots	2.8	3.0	2.2	2.4	1.7	2.4
Sugar & Sweeteners	146.7	104.7	128.7	111.0	126.4	123.5
Pulses	4.7	8.6	6.0	5.8	4.7	6.0
Tree nuts	157.1	-	-	238.1	134.6	176.6
Oil crops	28.6	36.4	47.2	55.0	52.2	43.9
Vegetable oils	181.3	191.0	174.5	183.5	191.6	184.4
Vegetables	1.3	1.7	1.0	0.7	1.7	1.3
Fruits (excluding wine)	0.9	1.0	0.7	0.5	0.9	0.8
Stimulants	2.7	2.4	3.1	1.2	8.6	3.6
Spices	66.0	74.0	32.3	60.8	53.9	57.4
Alcoholic beverages	6.4	5.3	2.7	2.7	4.0	4.2

3.6.2. IDR for animal products

The results (See Table 24 below) show that IDR for meat was very low throughout the period under review. This explains that Rwandan eat more local meat and the imports are very negligeable. Contrary, the fish IDR is relatively higher due to higher imports, following low local fishery production.

Table 24: Import Dependency Ratio (%) for groups of animal products, 2017-2021

	2017	2018	2019	2020	2021
Meat	1.5	2.1	2.1	1.4	5.7
Milk - Excluding Butter	43.5	39.4	34.3	27.3	34.1
Fish & sea food	77.1	73.2	71.6	77.2	66.5

3.7. Food Loss Index (FLI)

The Sustainable Development Target 12.3 states: «***By 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses, food loss percentages by commodity and in aggregate by country***». The Food Loss Index (FLI) is one of the indicators used to monitor this SDG Target for a basket of key commodities in a country's food systems. The FLI shows how many losses move from the base value equal to 100 in the base year. The FLI focuses on the supply levels of food chains and measures the change in percentage losses over time. The purpose of the Index is to allow policy makers to look at the positive and negative trends in food losses compared to a base year in order to improve the efficiency of the food supply system against food losses.

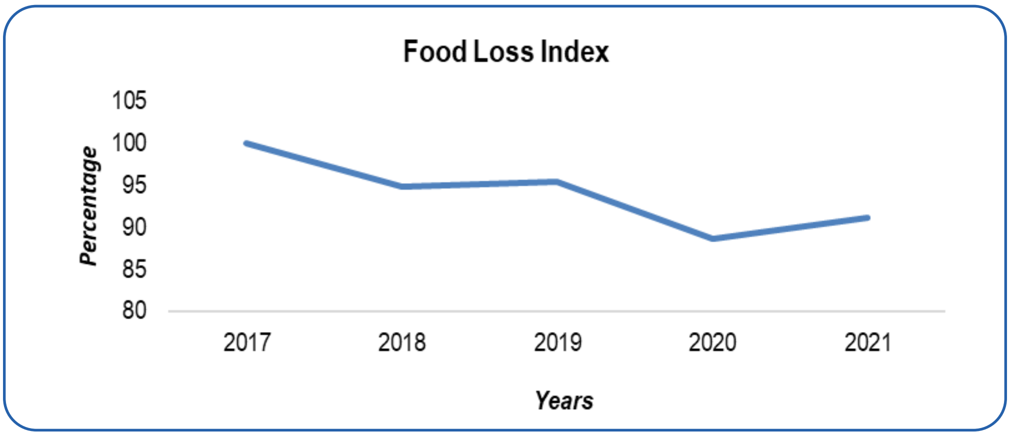
As recommended by the methodology, 10 commodities are considered in the basket. For the case of Rwanda, the following have been selected to FLI purposes: raw milk of cattle, dry beans, wheat, wheat flour, maize (corn), rice, plantains (cooking banana), fresh cassava, sweet potatoes and potatoes. The results show that from 2017 to 2021, the Food Loss Percentage (FLP) for Rwanda was estimated at an average of 4.7%, implying that 4.7% of the key commodities were lost along the supply chain and did not reach the retail stage.

Table 25: FLP of basket commodities

CPC Code	Commodity	2017	2018	2019	2020	2021
02211	Raw milk of cattle	5.0	5.0	5.0	5.0	5.0
01701	Beans, dry	4.0	3.0	3.0	1.5	1.5
23110	Wheat and meslin flour	5.0	4.9	5.3	5.4	6.7
0112	Maize (corn)	7.0	6.7	6.6	5.0	5.0
0113	Rice	6.9	5.4	5.4	5.0	5.0
0111	Wheat	2.0	2.0	2.0	2.0	2.0
01313	Plantains and others	9.0	9.0	9.0	9.0	9.0
01520.01	Cassava, fresh	3.0	3.0	3.0	3.0	3.0
01530	Sweet potatoes	6.1	6.1	6.1	6.1	6.1
01510	Potatoes	4.0	4.0	4.0	4.0	4.0
Food Loss Percentages	**FLP**	5.0	4.7	4.8	4.4	4.6

The results on FLI show that throughput the period, Rwanda experienced a decrease in food losses of 9.9 index points (See Figure 7 below). This improvement is attributed to efforts on post-harvest handling especially on maize, beans and rice. For more details on the methodology see Annex 1.

Figure 7: Food Loss Index (%) evolution



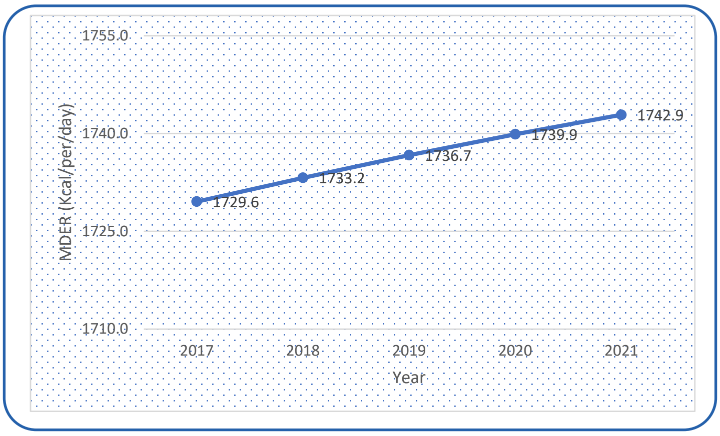
3.8. Prevalence of Undernourishment (PoU)

Prevalence of Undernourishment (PoU) is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life. Undernourished people refer to people whose diet cannot meet the Minimum Dietary Energy Requirement (MDER). For further details about the methodology, refer to Annex 2.

3.8.1 Evolution of the Minimum Dietary Energy Requirement

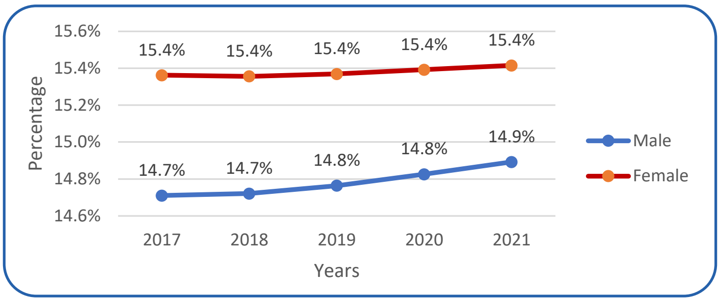
The analysis of the MDER for the period 2017-2021 showed an increasing trend from 1729.56 Kcal per capita per day in 2017 to 1742.89 Kcal per capita per day in 2021 (See Figure 8 below). The increasing trend in the MDER was attributed to the changes in population structure, particularly for males, although females also increased slightly. These data were derived by applying the algorithm for estimating the Minimum Dietary Energy Requirement developed by FAO

Figure 8: Evolution of Minimum Dietary Energy Requirement (Kcal/cap/day)



According to the estimates generated for the period under review, the MDER was highest for males aged 15-30 years. Rwanda's population structure in the period 2017-2021 indicated an increasing trend in the proportion of the population aged 15- 30 years, as shown in Figure 9 below. The proportion of the 15-30 years age group for men in the total population increased from 14.7% in 2017 to 14.9% in 2021, which led to a commensurate increase in the MDER per person per day in the population for the period under review.

Figure 9: Proportion (%) of the 15-30 years age group for males in the total population



3.8.2. Evolution of the Prevalence of Undernourishment (PoU)

According to FBS results (See Table 26 below), the PoU in Rwanda was estimated at an average of 33 percent, in other words, around 4 million of people in Rwanda were undernourished during the reference period. The analysis shows that MDER increased from 1730 Kcal/cap/day to 1743 Kcal/cap/day over the reference period. The same trend was observed for the number of people whose food intake was insufficient to meet the minimum Dietary Energy Requirements, with a continuous increasing from 3.9 in 2017 to 4.3 million in 2019 and 4.1 million for both 2020 and 2021.

Table 26: Prevalence of undernourishment, Rwanda 2017-2021

	2017	2018	2019	2020	2021	Average
PoU	33%	32%	34%	32%	32%	33%
Pop. in millions	3.9	3.9	4.3	4.1	4.1	4.1
MDER (Kcal/cap/day)	1,730	1,733	1,737	1,740	1,743	1,737

Box 3: Limitation of PoU

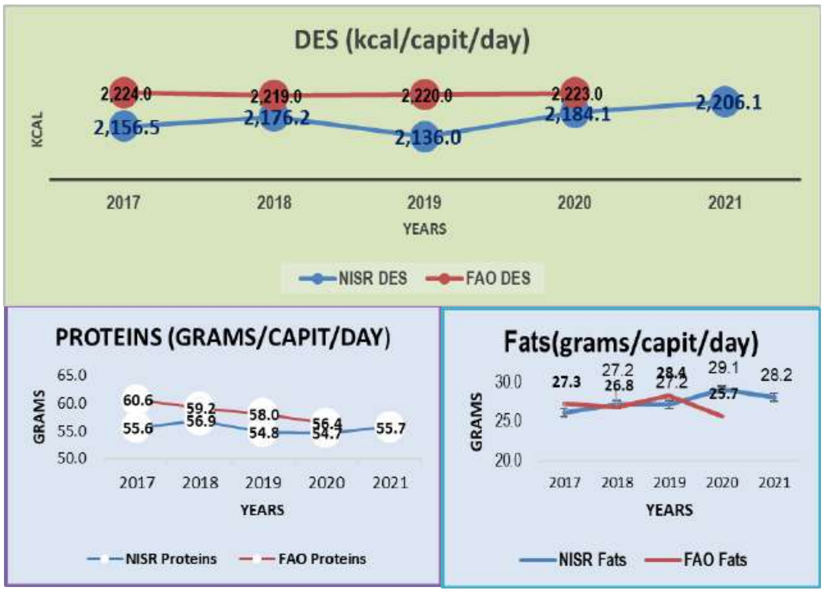
The Prevalence of Undernourishment is an estimate of the percentage of undernourished people in the country and it cannot be further disaggregated. It means that it is not possible to reliably identify which individuals are actually undernourished.

3.9. Comparison of Rwanda FBS results

FAO compiles and publishes annual FBS data onto FAOSTAT website, and their time series go up to 2020. Every year, it also calculates PoU numbers which are published through «The State of Food Security and Nutrition in the World”. This Section presents a comparison of Rwanda FBS results as produced by the country/ NISR with FAOSTAT data in terms of the DES per capita and per day (Kcal), daily per capita proteins supply (grams), and daily per capita fats supply (grams). It does the same for the PoU numbers as calculated by the country and FAO, respectively.

Because FAO data is only available up to 2020, the comparison was made from 2017 to 2020. Generally, the analysis shows that NISR FBS results are in line with the FAO ones with slightly higher differences. The observed differences in DES, proteins and fats are associated to data inputs used. Comparing both sources, banana, beans, potatoes and plantains are commodities with higher food inputs from FAO than NISR estimates.

Figure 10: Proportion (%) of the 15-30 years age group for males in the total population



3.9.1. Comparison of SUA basic data used

When the estimates of the main commodities that feed the FBS main indicators are compared to other estimates compiled before, especially by the FAO, results differ for each commodity. The following reasons are elaborated:

Banana: In Rwanda, there are three main categories for banana, banana for cooking, banana for beer and dessert banana. The main cause of the difference in the results is that FAO did not consider the quantity transformed into beer, because all produced quantity was considered as food consumed as the primary commodity. Here, what we put under banana is banana for beer and desert banana. It excludes Banana for cooking known as plantain in the classification of commodities. The difference is also that for some years (2017 and 2018) FAO considered the production of banana for cooking (plantain) as part of this group and report again the production of plantain.

Beans: The distinction is most noticeable in export and stock variation. NISR export quantities are higher than FAO export values. In contrast to export, FAO had a large amount of stock added to domestic supply, whereas NISR had no stock variation data except for 2017, when a small amount was added to domestic supply. Additionally, Seed also was a source of difference, since the estimated seed from FAO is less than that from country FBS.

Plantains: For Plantains (cooking banana), the difference is in loss quantities used. NISR losses quantities are higher than FAO's.

Potatoes: Similarly, to beans, FAO had a large amount of stock added to domestic supply, whereas NISR did not have stock variation data, except for 2017, when a small amount was added to domestic supply. When it comes to 2019 and 2020, the difference between FAO and Country FBS is reduced, because FAO does not have stock variation for these years.

Table 27: Input data comparison

	2017		2018		2019	
Items	**NISR**	**FAO**	**NISR**	**FAO**	**NISR**	**FAO**
Banana (Food)	**231,762**	**1 261,585**	**232,300**	**1 283,812**	**237,387**	**1 342,523**
Production	1 007,658	1 739,007	1 010,000	1 769,697	1 032,117	1 850,633
Processed	775,572	-	777,330	-	794,387	-
Loss	-	477,388	-	485,811	-	508,036
Beans, dry (Food)	**363,926**	**431,032**	**400,564**	**437,581**	**379,292**	**439,967**
Export	21,654	8,929	24,471	8,661	37,014	23,818
Stock variation	-1,257	-25,000	-	-27,000	-	-20,000
Plantains (Food)	**665,060**	**670,569**	**691,186**	**696,809**	**743,884**	**752,316**
Loss	65,865	61,260	68,441	63,657	73,677	68,728
Potatoes (Food)	**673,979**	**1 263,077**	**721,140**	**1 280,671**	**743,102**	**1 111,903**
Stock variation	-166	-600,000	-	-620,000	-	-344,500

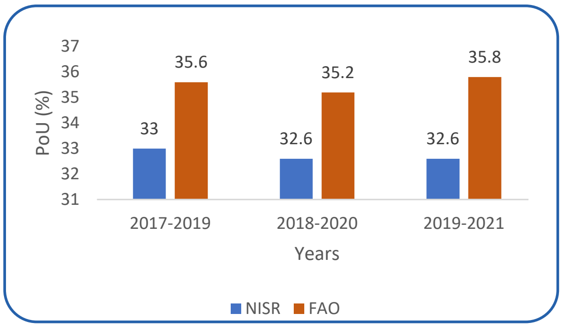
3.9.2. Comparison of PoU as calculated by Rwanda with FAO Results

FAO through its Agrifood Economics Dvision, and in collaboration with the Statistics Division and other Institutions, namely, International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Program (WFP) and the World Health Organization (WHO), produces regularly the ***"State of Food Security and Nutrition in the World (SOFI)"***.

The Prevalence of Undernourishment (PoU) is one of the indicators highlighted in the SOFI Reports and it is presented in the report as three years average. The three years covered in the recent reports are as follows:

SOFI Report	Reference Period for PoU	PoU for Rwanda
2020 Report	Average 2017-2019	35.6
2021 Report	Average 2018-2020	35.2
2022 Report	Average 2019-2021	35.8

Figure 11: Comparison of PoU, NISR Vs FAO estimates



As shown in the Figure 11 above, the Prevalence of Undernourishment as published in SOFI Reports is in little bit higher than those calculated by the country.

Among other factors that could explain the differences (between country PoU and the one from SOFI) we have:

- The population numbers used: Numbers on population disaggregated by sex and age group are input in the computation of Minimum Energy Requirement (MDER). While FAO is considering UN Department of Economic and Social Affairs (DESA) Population Prospects, the country used the NISR data (population from census and projection). This difference in the population numbers used lead to obtain different values of MDER.

Table 28: Comparison of Population (thousands) data-Country Vs FAO

Year	2017	2018	2019	2020
Country	11 809	12 090	12 374	12 663
FAO	11 981	12 302	12 627	12 952

- Dietary Energy Supply (DES): In the computation of PoU, SOFI is using FAOSTAT FBS tim series as input. As mentioned at the beginning of Section 3.9 (See Figure 10), those results are not the same as the ones calculated by the country.

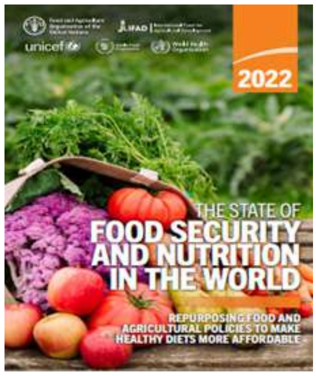
Probably, there are other factors that could explain the observed differences, but we don't have more details about the other inputs used in the computation of PoU for Rwanda in SOFI Report.

Avarage 2017-2019
PoU for Rwanda=35.6%
(*see page 165*)

https://www.fao.org/3/ca9692en/ca9692en.pdf

Avarage 2018-2020
PoU for Rwanda=35.2%
(*see page 131*)

https://www.fao.org/3/cb4474en/cb4474en.pdf



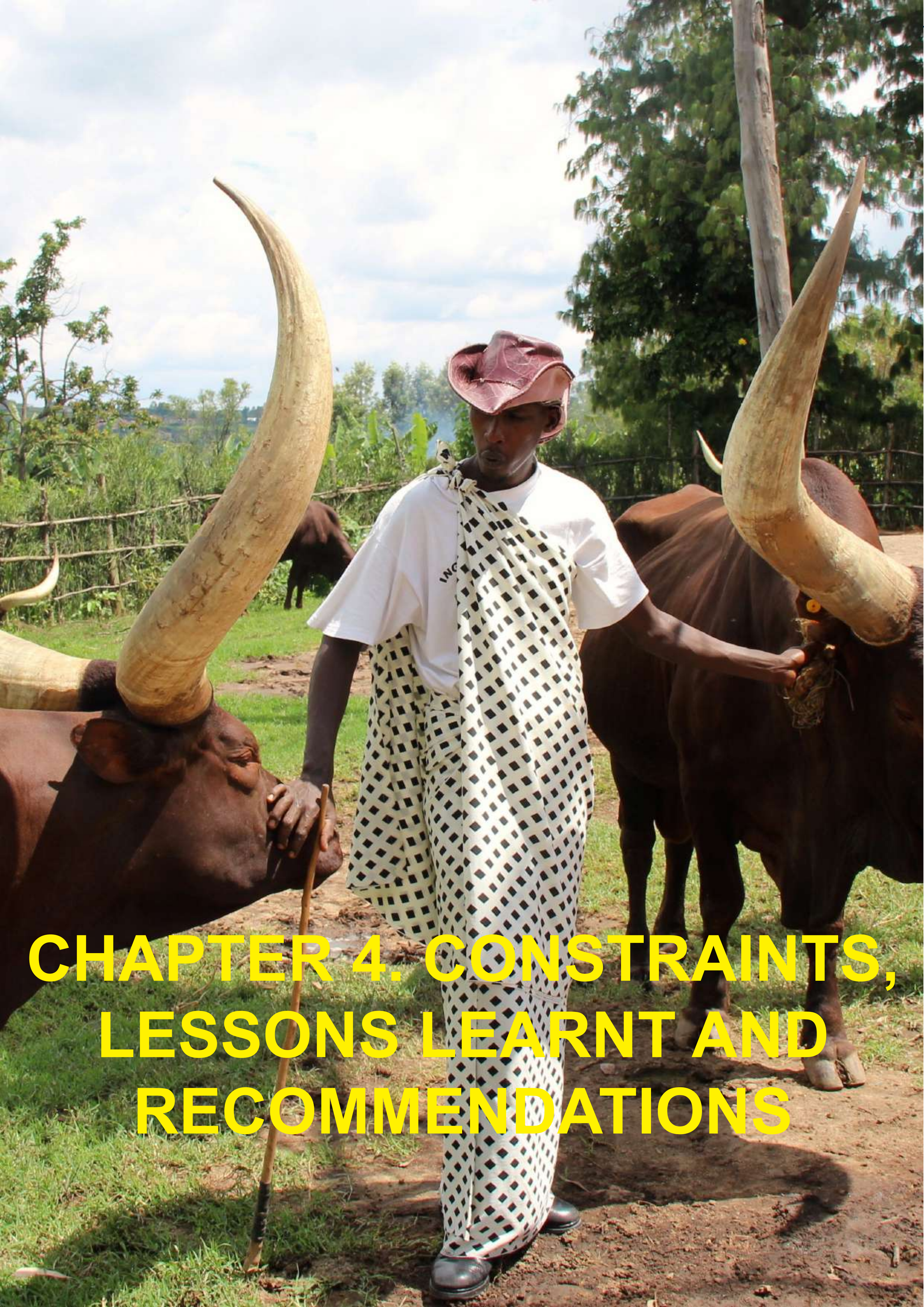
Avarage 2019-2021
PoU for Rwanda=35.8%
(*see page 137*)

https://www.fao.org/3/cc0639en/cc0639en.pdf

3.10. Conclusion

The Rwanda FBS results show that vegetal products are major sources of the population's nutrient contents, as measured by per capita energy, proteins, and fats. Moreover, there is evidence that Rwanda has a high level of self-sufficiency but still requires more imports to meet domestic demand, implying that one-third of used food commodities are obtained through imports.

Furthermore, the number of undernourished (whose diet cannot meet the Minimum Dietary Energy Requirement) has steadily increased over the review period, although the PoU slightly decreased. The comparison made between Rwanda FBS results and those of FAOSTAT, especially on calories, proteins and fats, reveals that they in the same range, but with some slight differences. We can confirm that FBS results produced by the country are valid and with better quality, as such differences are explained by use of different input/basic data. As a result, the first Rwanda FBS analysis laid the groundwork for future FBS compilations. The FBS compilation sustainability is possible provided that the system is strengthened to better measure and analyze the food security situation in the country.



CHAPTER 4. CONSTRAINTS, LESSONS LEARNT AND RECOMMENDATIONS

4.1. Constraints

In the process of compiling the FBS, data from several sources and human resources are crucial to gather the results. During the exercise of compiling Rwanda FBS, the following limitations were identified:

- Capacity of local staff in compilation of FBS was limited since it was the first time they compile the FBS. The international consultant was involved in the whole compilation process to ensure the compilation is smooth and completed.
- For incomplete and missing data, the national FBS Team had to estimate and/or impute the missing data in order to create the SUA/FBS.
- Lack of country level data such as, nutrient factors, Technical Conversion Factors (extraction, seed and loss rates data). For seed and loss rates, they exist only for some commodities (rice, potatoes, wheat, beans, maize, millet, sorghum, peas, groundnuts). Therefore, the national FBS Team resorted to using standard TCF and nutrient factors for the rest of other commodities.
- The compilation of fishery products has not been considered in the FBS guidelines, and related compilation Tool. This was done separately and added to the FBS results as obtained from the Tool.

4.2. Lessons learnt

- The training of national experts is crucial to initiate the activities of FBS compilation. The time allocated to this activity has allowed participants to assimilate all aspects of the methodology, as well as the hands-on/ practical exercises.
- The FBS compilation has demonstrated that, there is room for deep statistical analysis of existing data, given the variety of data and level of precision needed.
- Sustaining FBS compilation is perceived as an opportunity to bridge the data gaps through expanded data collection.
- Participative approach leads to success in the process of compiling Rwanda FBS.

4.3. Conclusion and Recommendations

The reliability of FBS results is determined by the availability and precision of input data, particularly production, trade, food use, and population figures. The Rwanda FBS TWG has made every effort to make available the official data that was used, ensuring that the FBS results accurately reflect Rwanda's food security situation. A reliable, sustainable and robust FBS compilation system has been established, and the TWG FBS has been capacitated enough, involved and equipped to use it; however, additional efforts will be continuously required to fully equip the FBS TWG members with the needed resources, and ensure a strong and long-lasting framework for ongoing and future compilations. The recommendations are hereunder described:

- To ensure the continuity of FBS, it is crucial to mainstream the FBS activities into the annual work program of NISR.
- Ensure continuous capacity building of the FBS TWG Group and operationalize it, and provide the FBS Core Team with the needed resources to fulfill to their assignment.
- Bridge the gap of missing data by incorporating data required for FBS compilation in existing data collection frameworks. This will enable the generation of accurate and reliable country specific data that leads to quality further improvement of FBS results.

REFERENCES

1. FAO, Methodological Proposal for Monitoring SDG Target 12.3. The Global Food Loss Index design, Data collection methods and Challenges, 6 November 2018. Available at: http://www.fao.org/3/ca4012en/ca4012en.pdf.

2. Guidelines for the compilation of Food Balance Sheets. October 2017. Available at: http://gsars.org/en/guidelines-for-the-compilation-of-food-balance-sheets/.

3. Ministry of Agriculture and Animal Resources, Annual Report 2020-2021.Available at: https://www.minagri.gov.rw/fileadmin/user_upload/Minagri/Publications

4. National Institute of Statistics of Rwanda (NISR). Seasonal Agricultural Survey annual reports 2017-2021. Available at: www.statistics.gov.rw.

5. National Institute of Statistics of Rwanda (NISR) [Rwanda], Ministry of Health (MOH) [Rwanda], and ICF. 2021, Rwanda Demographic and Health Survey 2019-20 Final Report. Kigali, Rwanda, and Rockville, Maryland, USA: NISR and ICF. Available at: www.statistics.gov.rw.

6. National Institute of Statistics of Rwanda (NISR) [Rwanda], Ministry of Health (MOH) [Rwanda], and ICF International. 2015. Rwanda Demographic and Health Survey 2014-15. Rockville, Maryland, USA: NISR, MOH, and ICF International. Available at www.statistics.gov.rw.

7. National Institute of Statistics of Rwanda (NISR), The Third National Strategy for the Development of Statistics, NSDS3, September 2019. Available at: www.statistics.gov.rw

8. National Institute of Statistics of Rwanda (NISR), Ministry of Finance and Economic Planning (MINECOFIN) [Rwanda], 2012. Fourth Rwanda Population and Housing Census. Thematic Report: Population Projections. Available at: www.statistics.gov.rw.

9. National Institute of Statistics of Rwanda (NISR), 2021. GDP-National Accounts. Available at: www.statistics.gov.rw.

10. National Institute of Statistics of Rwanda (NISR), 2022. Consumer Price Index - July 2022. Available at: www.statistics.gov.rw.

11. Technical conversion factors for agricultural commodities. Available at: http://www.fao.org/fileadmin/templates/ess/documents/methodology/tcf.pdf.

12. The State of Food Security and nutrition in World (SOFI), FAO (2020). Available at: https://www.fao.org/3/ca9692en/ca9692en.pdf.

13. The State of Food Security and nutrition in World (SOFI), FAO (2021). Available at: https://www.fao.org/3/cb4474en/cb4474en.pdf.

14. The State of Food Security and nutrition in World (SOFI), FAO (2022). Available at: https://www.fao.org/3/cc0639en/cc0639en.pdf.

ANNEXES

Annex 1.1. Methodology for estimating Food Loss Index

This is a brief description of the methodology on how to estimate the Food Loss Index (FLI). The details can be accessed in FAO (2018). The FLI is a composite index for essential products in the production of a country. The aggregate index is used for national, global, and international monitoring of progress accomplished for achieving the Target 3 of SDG 12. In addition, countries can calculate, if needed basic data are available, FLIs to disaggregated level, by geographic area or by agro-ecological zone, or at different links of the value chain (farms, transport, markets, processors etc.). Then the FLI of all countries can be aggregated to obtain the The Global Food Loss Index (GFLI).

The calculation of the Global Food Loss Index follows therefore following steps:

1. Choice of a base year;
2. Selection of the basket of goods and compilation of the weight of each good at the base year;
3. Estimated loss percentages for each product and Food Loss Percentage (FLP) in the country;
4. Comparison of FLPs over time and calculating the FLI;
5. Aggregation of FLIs to deduct GFLI.

Selection of the basket of goods

The selection of products is done taking into account national targets. Indeed, it is difficult to find loss estimates for all products consumed in all countries for timer the Global Index and facilitate international comparisons. Since dietary diversity and achieving food security are the key priorities targeted through the calculation of the FLI, the basket must contain a structured set of product headings covering many facets of a typical diet. These headings are the following: (1) Cereals & Pulses, (2) Fruits & Vegetables, (3) Roots & Tubers and Oil-Bearing crops, (4) Animals Products, and (5) Fish and Fish Products). 10 products are recommended to be selected in these different headings.

The international recommendation is to constitute the 5 groups and choose two products in each group. The method of selection of products, which is internationally followed, is to rank the value of the production of the products by country and by group and choose the two products which have the highest production value in the group. The selection process is based on the international dollar value of commodity in the base year.

At the national level, countries can use their own set of values or quantities and their prices, or use different criteria based on policies, provided that the main headings are covered. Once the basket of products is chosen, this basket remains fixed at the national/global levels to allow comparisons over time. In addition, FAO explains that:

- The headings correspond to basic food groups and dietary needs. Each country therefore should have at least one priority product in each heading.
- Product loss levels within headings should be broadly similar, within countries, while average losses between categories will be systematically different. For example, the variation of losses in fruits is higher than those in grains, but within grains losses may be similar.

Estimated percentages of losses of each commodity and FLP

Once the basket of commodities has been chosen, the next step is to calculate loss percentages. The losses are expressed as a percentage of the total of Production + Import. The choice of percentages instead of loss values are justified by the fact that the percentages are relatively stable over time as opposed to values. For each product, the percentage of loss L_{ijt} by country (i), commodity (j) and year (t) is either estimated or observed.

These percentages can be obtained through surveys of farmers by including modules in the survey on post-harvest losses and estimate percentages losses according to certain methodologies as proposed in the

International Guidelines related to it. The Food Loss Percentage (FLP) therefore provides the average level of loss and can help countries to assess the level and extent of food losses of their country compared to others, or in an international context.

It is calculated using the following formula:

$$FLP_t = \frac{\sum_j L_{jt}*(q_{jt_o} * p_{jt_o})}{\sum_j (q_{jt_o} * p_{jt_o})}$$

Where:

Ljt = loss percentage (estimated or observed) for commodity j in year t;
to = the base year;
qjto = Production plus Imports for commodity j in the base year;
pjto = International dollar price for commodity j in the base year.

Calculation of the Food Loss Index (FLI)

The country-level indices (FLI) are simply equal to the ratio of the Food Loss Percentage in the current period and the FLP in the base period multiplied by 100.

$$FLI_t = \frac{FLPt}{FLPto} X\ 100$$

While that the FLP_t is the country's food loss percentage in year t, The related FLIt shows how much losses move from the baseline value equal to 100 in the base year.

Compilation of Global Food Loss Index (GFLI)

The GFLI is obtained through a weighted average of single indices calculated for all countries in the world (FLI). In order to aggregate the FLI into the GFLI or in Regional FLI, country indices are aggregated using the weighting equal to the total value of agricultural production for the year of reference. The GFLI weights reflect importance the overall value of the basket of commodities in relative international dollar terms to the rest of the World. Regarding the FLI, the weights also constitute the value of commodities in terms of the international dollar but relative to the production value of the country. The weighting is determined in the reference year.

GFLI is calculated using the following formula:

$$GFLIt = \frac{\sum_{i=1}^{G} FLIit * Wi}{\sum_{i=1}^{G} Wi} X100$$

Wher:

Wi = total value of agricultural production of country i at international dollar prices in the base period. FLIit= is the country's Food Loss Index.

Box 4: Application of the FAO methodology-FLI: The case of Rwanda

Application of the FAO methodology: The case of Rwanda

The computation of the Food Loss Index (FLI) for Rwanda followed the methodology proposed by FAO. The required data include production (Crops and livestock, including fishery) and commodity prices. The production, import, prices, and loss ratios data were collected from NISR and MINAGRI. The quantities of losses are those from the Food Balance Sheets results. The methodology recommends the base year of 2015 because it is the start of measurement and monitoring of the SDGs but in Rwanda case it is 2017.

As recommended by the methodology, a basket of 10 key commodities were to be selected, with top two commodities in each of the five main headings (1. Cereals & Pulses, 2. Fruits & Vegetables, 3. Roots & Tubers and Oil-Bearing crops, 4. Animals Products, 5. Fish and Fish Products. The selection was according to their importance (in terms of value of production) in their respective commodity headings. However, in Rwanda case this selection was also dependent on the availability of data on loss quantities. That is why, in the « Fish and Fish Product" group there is any commodity selected. From reasons above the 10 key commodities selected were: Raw milk of cattle, Beans(dry), Wheat and meslin flour, Maize(corn), Rice, Wheat, Plantains and others, Cassava(fresh), Sweet potatoes and Irish potatoes. Having the production quantity, import quantity, loss quantity and prices for each of the 10 selected commodities, the calculation of the FLI followed the FAO methodology described above.

The computation of the FLI was done using basic Microsoft Excel to produce the results which are analyzed in Section 3.7 of this report. For each year and commodity, the loss percentages were first calculated as well as their aggregation at national level; and from there, the FLI for each year was computed, with 2017 as the base year.

NB: The Global Food Loss Index is not appropriate because we are dealing with only one country.

Annex 1.2. Methodology for estimating Prevalence of Undernourishment

Introduction

The FAO prevalence of undernourishment (PoU) indicator monitors progress towards Millennium Development Goal target 1C of halving, between 1990 and 2015, the proportion of people suffering from hunger. Estimates of the number of undernourished (NoU) calculated by multiplying the PoU by the size of the reference population are used to monitor progress towards the World Food Summit goal of reducing by half the number of people suffering from undernourishment.

The PoU indicator is defined as the probability that a randomly selected individual from the reference population is found to consume less than his/her calorie requirement for an active and healthy life. It is written as:

$$PoU = \int_{x<MDER} f(x)dx$$

Where $f(x)$ is the probability density function of per capita calorie consumption.

The parameters needed for the calculation of the indicator are: the mean level of dietary energy consumption (DEC); a cut-off point defined as the Minimum Dietary Energy Requirement (MDER); the coefficient of variation (CV) as a parameter accounting for inequality in food consumption; and a skewness (SK) parameter accounting for asymmetry in the distribution. The DEC as well as the MDER are updated annually, with the former calculated from the FAO Food Balance Sheets. The MDER is calculated as a weighted average of energy requirements according to sex and age class and is updated each year from UN population ratio data. The inequality in food consumption parameters is derived from National Household Survey data when such data is available and reliable. Due to the limited number of available household surveys, the inequality in food access parameters is updated much less frequently over time than the DEC and MDER parameters.

To implement this methodology, it is necessary to: (i) choose a functional form for the distribution of food consumption $f(x)$; (ii) identify values for the three parameters, that is, for mean food consumption (DEC), its variability (CV) and its asymmetry (SK); and (iii) compute the MDER threshold. The probability density function used to infer the habitual levels of dietary energy consumption in a population, $f(x)$, refers to a typical level of daily energy consumption during a year. As such, f(x) does not reflect the possible implications of insufficient food consumption levels that may prevail over shorter periods. Both the probability distribution $f(x)$ and the MDER threshold are associated with a representative individual of the population, of average age, sex, stature and physical activity level.

Functional Form

The FAO methodology for the calculation of the prevalence of undernourishment uses a probability framework in which the distribution of per capita calorie consumption of the representative individual is characterized. The use of such a framework is necessary, as data typically are not available on individual food consumption and requirements, but rather for household acquisition. Starting with the estimates of undernourishment produced for the Sixth World Food Survey in 1996, the distribution was assumed to be lognormal. This model is very convenient for the purposes of analysis, but has limited flexibility, especially in capturing the skewness of the distribution.

As part of the revisions made for the 2012 edition of The State of Food Insecurity in the World Report, the methodology moved away from the exclusive use of the two parameters lognormal distribution to adopt the more flexible three parameter skew-normal and skew- lognormal families [3]. In the case of the lognormal distribution, the skewness can be written as function of the CV as:

SK = (CV^2+3) *CV (1)

This implies that the SK for the lognormal distribution is completely determined by the CV derived from household survey data. The flexibility gained from the additional parameter allows for independent characterization of the asymmetry of the distribution. The skew-normal distribution can be considered a generalization of the normal distribution that can account for departures from normality to a certain degree, corresponding to skewness values within the approximate range (-0.995, 0.995). The distribution cannot be evaluated at higher levels of asymmetry, and so ways to deal with higher degrees of skewness need to be found. One solution is to consider only the restricted range of the skewed-normal distribution in the calculation of the PoU. Another solution is to add another level of flexibility in which the functional form for the distribution itself is allowed to change, based on the level of asymmetry in the data. The identification of the appropriate combination of functional forms as well as the level of asymmetry at which to change functional forms motivates the investigations below.

The simplest way to handle skewness outside of the range of the skewed-normal distribution is to place a ceiling on the SK parameter (such as 0.99) and to use this limit for higher degrees of asymmetry. The implementation of this approach (referred to as **Function 1**) – in (a) the PoU is shown as a function of the SK parameter with the other parameters fixed (DEC equal to 2000, MDER equal to 1800, and CV equal to 0.35) and in (b) the density function is shown the with the same parameters fixed but with the SK equal to zero (corresponding to the normal distribution), 0.75, and 0.99 (the ceiling). High levels of asymmetry in the data may indicate that the skew-normal distribution is not the appropriate model, and alternative criterions for the selection of the functional form are described below.

As a first alternative to the application of the skewed-normal distribution described above, consider replacing the ceiling with a new value W, and evaluating the log-normal distribution for skewness values higher than W. If we denote the PoU evaluated using the lognormal distribution as PoULN, we can write this criterion for the choice for the distribution (**Function 2**) as:

PoU = PoULN (DEC, CV, SK, MDER), SK ≥ W (2a)
PoU = PoUSN (DEC, CV, SK, MDER), SK < W (2b)

Although the two different functional forms for the distribution do allow for a wider range of levels of asymmetry to be captured, discontinuities in the PoU occur as the functional form transitions from one to the other. An intermediate distribution may help to link such a gap, and this is the motivation behind the criterion below for the choice of the functional form.

As a modification of the criterion described above, consider using the log-skewed-normal distribution2 (denoted by PoULSN) as an intermediate between the transition of the functional form from the skewed-normal to the log-normal, as written below:

PoU = PoULN (DEC, CV, SK, MDER),	SK ≥ (CV2 +3) CV	(3a)
PoU = PoULSN (DEC, CV, SK, MDER),	W<SK <(CV2 +3)CV	(3b)
PoU = PoUSN (DEC, CV, SK, MDER),	SK < W (2b)	(3b)

In the criterion written above (**Function 3**), the skewness implied theoretically by the lognormal is used both as a floor for the application of the lognormal and as a ceiling for the application of the log-skewed-normal. The fixed switch point W is used as a floor for the application of the log-skewed-normal and as a ceiling for the application of the skewed- normal.

Estimating and projecting mean food consumption

To compute per capita DEC in a country, FAO has traditionally relied on Food Balance Sheets, which are available for more than 180 countries. This choice was due mainly to the lack, in most countries, of suitable surveys conducted regularly. Through data on production, trade and utilization of food commodities, the total amount of dietary energy available for human consumption in a country for a one-year period is derived using food composition data, allowing computation of an estimate of per capita dietary energy supply.

During the revision for The State of Food Insecurity in the World 2012 a parameter that captures food losses during distribution at the retail level was introduced in an attempt to obtain more accurate values of per capita consumption. Region-specific calorie losses were estimated from data provided in a recent FAO study and ranged from 2 percent of the quantity distributed for dry grains, to 10 percent for perishable products such as fresh fruits and vegetables.

Estimating the MDER threshold

To calculate the MDER threshold, FAO employs normative energy requirement standards from a joint FAO/WHO/United Nations University expert consultation in 2001. These standards are obtained by calculating the needs for basic metabolism – that is, the energy expended by the human body in a state of rest – and multiplying them by a factor that takes into account physical activity, referred to as the physical activity level (PAL) index.

As individual metabolic efficiency and physical activity levels vary within population groups of the same age and sex, energy requirements are expressed as ranges for such groups. To derive the MDER threshold, the minimum of each range for adults and adolescents is specified on the basis of the distribution of ideal body weights and the mid-point of the values of the PAL index associated with a sedentary lifestyle. The lowest body weight for a given height that is compatible with good health is estimated from the fifth percentile of the distribution of body mass indices in healthy populations.

Once the minimum requirement for each sex-age group has been established, the population-level MDER threshold is obtained as a weighted average, considering the relative frequency of individuals in each group as weights. The threshold is determined with reference to light physical activity, normally associated with a sedentary lifestyle. However, this does not negate the fact that the population also includes individuals engaged in moderate and intense physical activity. It is just one way of avoiding the overestimation of food inadequacy when only food consumption levels are observed that cannot be individually matched to the varying requirements.

A frequent misconception when assessing food inadequacy based on observed food consumption data is to refer to the mid-point in the overall range of requirements as a threshold for identifying inadequate energy consumption in the population. This would lead to significantly biased estimates: even in groups composed of only well-nourished people, roughly half of these individuals will have intake levels below mean requirements, as the group will include people engaged in low physical activity. Using the mean requirement as a threshold would certainly produce an overestimate, as all adequately nourished individuals with less than average requirements would be misclassified as undernourished.

FAO updates the MDER thresholds every two years based on regular revisions of the population assessments of the United Nations Population Division and data on population heights from various sources, most notably the Monitoring and Evaluation to Assess and Use Results of Demographic and Health Surveys project coordinated by the United States Agency for International Development (USAID). This edition of The State of Food Insecurity in the World uses updated population estimates from the 2012 revision published by the United Nations Population Division in June 2013. When data on population heights are not available, reference is made either to data on heights from countries where similar ethnicities prevail, or to models that use partial information to estimate heights for various sex and age classes

Box 5: Application of FAO methodology-MDER: The case of Rwanda

Application of FAO methodology-MDER: The case of Rwanda

The Minimum Dietary Energy Requirements (MDER) are determined using standards established by the FAO/WHO expert group on energy needs. There is a computation developed under Microsoft Excel that automatically calculates the MDER, once the input parameters are entered. The input parameters are:

- Population projections by age group and sex, provided by NISR
- The anthropometric data (height and weight of children under 5), as well as those of women of 15-49 years (height, Body Mass Index) are provided by the RDHS (2019/20).
- Body Mass Index (BMI) of men as well as women outside childbearing age group (0-14 years and over 49 years), weight gain for age, energy per kg of weight gained, and level of physical activity for age from 5 years to more than 70 years; this data was obtained from the World Health Organization (WHO).
- A combination of the above input parameters makes it possible to generate estimates for the MDER for male and female separately.
- Also required is to estimate the MDER of pregnant women in population. To do this, two other parameters were integrated into the model:
  - The birth rate, obtained from RDHS (2019/20)
  - The DER of an average pregnant woman is estimated by multiplying the birth rate by 210 kilocalories, assuming an estimated daily requirement of 280 kilocalories during pregnancy over 75 per cent of the year.
- The Coefficients of Variation (CV) linked to the consumption of the Rwanda population was obtained from the FAO Food Security indicators as 0.37.
- The average Dietary Energy Consumption (DEC) per capita per year comes from the FBS detailed results. It is actually, the DES per capita generated in the context of developing the Rwanda FBS 2017-2021, which is used as proxy of DEC.

Following the FAO methodology, to estimate the Prevalence of Undernourishment, we assumed the distribution of the DEC within Rwanda population to be log-normal.

Finally, the population undernourished for a given year in the case of Rwanda was estimated by multiplying the Prevalence of Undernourishment for the year by the total population of the same year.

Annex 1.3. Rwanda FBS results 2017-2021

RWANDA FOOD BALANCE SHEETS 2017 Population ('000): 11,809

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY: Calories	PER DAY: Proteins	PER DAY: Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Grand total													**2,157**	**56**	**26**
Vegetal prod.													**2,116**	**52**	**24**
Animal prod.													**41**	**3**	**2**
Cereals (excl. beer)	**707**	**669**	**203**	**84**	**1089**	**33**	**70**	**12**	**16**	**6**	**952**	**81**	**666**	**17**	**5**
Wheat and products	11	232	72	7	164	0	15	0	1	0	147	12.5	94	3	0
Barley and products	0	7	5	0	2	0	0	0	0	2	0	0.0	0	0	0
Maize and products	410	129	40	6	493	0	38	7	10	3	435	36.9	335	9	4
Rye and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oats and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Millet and products	1	0	0	0	2	0	0	0	0	0	2	0.1	1	0	0
Sorghum and products	160	29	1	0	188	33	6	3	4	0	142	12.0	108	3	1
Rice & Prod (Milled Equivalent)	120	272	85	70	236	0	11	2	1	0	221	18.7	124	2	0
Cereals, Others & Products	5	0	0	0	5	0	0	0	0	0	5	0.4	4	0	0
Starchy roots	**3,194**	**94**	**27**	**-71**	**3,332**	**0**	**155**	**0**	**116**	**11**	**3,050**	**258.3**	**655**	**8**	**1**
Potatoes and products	847	33	10	0	871	0	35	0	116	1	719	60.9	119	3	0
Cassava and products	1,042	57	17	0	1,082	0	31	0	0	8	1,042	88.3	253	1	0
Sweet potatoes	1,082	4	0	-71	1,157	0	66	0	0	2	1,089	92.2	243	3	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
													PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Yams	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Roots & Tubers, Other & Prod.	223	0	0	0	223	0	22	0	0	0	200	17.0	40	1	0
Sugar crops	**109**	**0**	**0**	**0**	**109**	**99**	**0**	**0**	**0**	**0**	**11**	**0.9**	**1**	**0**	**0**
Sugar cane	109	0	0	0	109	99	0	0	0	0	11	0.9	1	0	0
Sugar Beets	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Sweeteners	**12**	**171**	**8**	**59**	**116**	**0**	**0**	**0**	**0**	**1**	**116**	**9.8**	**93**	**0**	**0**
Sugar non-centrifugal	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Prod. (raw equivalent)	12	169	7	59	115	0	0	0	0	0	115	9.7	92	0	0
Sweeteners, other & prod.	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Honey	0	1	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pulses	**467**	**21**	**37**	**-1**	**452**	**0**	**19**	**0**	**57**	**1**	**375**	**31.8**	**292**	**19**	**1**
Beans, Dry & Products	454	6	22	-1	440	0	18	0	57	1	364	30.8	283	18	1
Peas, Dry & Products	12	0	0	0	12	0	1	0	0	0	11	1.0	9	1	0
Pulses, Other and products	0	15	15	0	0	0	0	0	0	0	0	0.0	0	0	0
Treenuts	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Nuts and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops	**44**	**17**	**1**	**0**	**61**	**0**	**3**	**0**	**3**	**1**	**54**	**4.6**	**44**	**3**	**3**
Soyabeans & Products	24	7	0	0	30	0	2	0	0	1	28	2.4	22	2	1
Groundnuts (Shelled Eq)	21	10	1	0	31	0	2	0	3	0	26	2.2	22	1	2

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
												PER YEAR FOOD	PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food		Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Sunflower seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Rape and Mustardseed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Coconuts - Incl Copra	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesame seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernels	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olives (including preserved)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops, Other	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Vegetable oils	**0**	**116**	**52**	**0**	**64**	**0**	**0**	**0**	**0**	**7**	**57**	**4.8**	**117**	**0**	**14**
Soyabean Oil	0	4	0	0	4	0	0	0	0	0	4	0.3	7	0	1
Groundnut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sunflowerseed Oil	0	8	0	0	7	0	0	0	0	0	7	0.6	15	0	2
Rape and Mustard Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernel Oil	0	1	0	0	0	0	0	0	0	0	0	0.0	1	0	0
Palm Oil	0	78	28	0	50	0	0	0	0	4	46	3.9	94	0	11
Coconut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesameseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olive & Residue Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Maize Germ Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops Oil, Other	0	25	23	0	2	0	0	0	0	2	0	0.0	0	0	0
Vegetables	**515**	**7**	**8**	**0**	**514**	**0**	**0**	**0**	**0**	**1**	**513**	**43.4**	**25**	**1**	**0**
Tomatoes and products	97	1	2	0	96	0	0	0	0	0	96	8.1	4	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
													PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Onions, Dry	12	0	0	0	12	0	0	0	0	0	12	1.1	1	0	0
Vegetables, Other & Prod.	405	6	6	0	405	0	0	0	0	1	404	34.2	20	1	0
Fruits (Excluding Wine)	**1,749**	**16**	**6**	**0**	**1,759**	**776**	**66**	**0**	**0**	**2**	**915**	**77.5**	**150**	**2**	**0**
Oranges, Tang-Mand & Prod.	0	8	4	0	4	0	0	0	0	0	4	0.3	0	0	0
Lemons, Limes and products	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapefruit and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Citrus Fruit nes & prod	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Bananas	1,008	0	0	0	1,008	776	0	0	0	0	232	19.6	32	1	0
Plantains	731	0	0	0	732	0	66	0	0	1	665	56.3	116	1	0
Apples and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Pineapples and products	0	1	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Dates	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapes and products (excl wine)	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Fruits, Other & Products	10	6	1	0	14	0	0	0	0	0	14	1.2	2	0	0
Stimulants	**143**	**3**	**48**	**0**	**98**	**0**	**0**	**0**	**0**	**0**	**98**	**8.3**	**9**	**2**	**0**
Coffee and products	26	2	21	0	7	0	0	0	0	0	7	0.6	1	0	0
Cocoa Beans and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Tea (including mate)	117	0	26	0	91	0	0	0	0	0	91	7.7	8	2	0
Spices	**1**	**2**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**4**	**0.3**	**3**	**0**	**0**
Pepper	1	0	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pimento	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cloves	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Spices, other	0	2	0	0	3	0	0	0	0	0	3	0.2	2	0	0
Alcoholic beverages	**478**	**32**	**2**	**0**	**509**	**0**	**0**	**0**	**0**	**2**	**507**	**42.9**	**53**	**0**	**0**
Wine	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Barley Beer	0	10	1	0	9	0	0	0	0	0	9	0.8	1	0	0
Beverages, fermented	478	22	1	0	499	0	0	0	0	1	498	42.2	52	0	0
Beverages, alcoholic	0	1	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Alcohol, non food	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Meat	**42**	**1**	**2**	**0**	**41**	**0**	**0**	**0**	**0**	**0**	**40**	**3.4**	**18**	**1**	**1**
Meat & Products, Bovine	32	0	0	0	32	0	0	0	0	0	32	2.7	14	1	1
Meat & Prod, Sheep & Goat	4	0	1	0	4	0	0	0	0	0	4	0.3	1	0	0
Meat & Products, Pig	3	0	1	0	2	0	0	0	0	0	2	0.2	2	0	0
Meat & Products, Poultry	2	0	0	0	2	0	0	0	0	0	2	0.2	1	0	0
Meat & Products, Other Anim.	1	0	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Offals	**7**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**7**	**0.6**	**2**	**0**	**0**
Offals, Edible	7	0	0	0	7	0	0	0	0	0	7	0.6	2	0	0
Animal fats	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0.1**	**2**	**0**	**0**
Fats, Animals, Raw	1	0	0	0	1	0	0	0	0	0	1	0.1	2	0	0
Milk - Excluding Butter	**66**	**39**	**16**	**0**	**89**	**1**	**3**	**0**	**0**	**0**	**85**	**7.2**	**11**	**1**	**1**
Milk & Prod (Excluding Butter)	66	39	16	0	89	1	3	0	0	0	85	7.2	11	1	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Eggs	**5**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**4**	**0.4**	**1**	**0**	**0**
Eggs and products	5	0	0	0	5	0	0	0	0	0	4	0.4	1	0	0
Fish & sea food	**6**	**20**	**1**	**0**	**25**	**0**	**0**	**0**	**0**	**0**	**25**	**2.1**	**7**	**1**	**0**
Miscellaneous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Infant food	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

RWANDA FOOD BALANCE SHEETS 2018

Population ('000): 12 090

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Grand total													**2,176**	**57**	**27**
Vegetal prod.													**2,135**	**54**	**25**
Animal prod.													**41**	**3**	**2**
Cereals (excl. beer)	**714**	**647**	**266**	**0**	**1,095**	**36**	**67**	**12**	**17**	**4**	**960**	**79**	**655**	**16**	**5**
Wheat and products	13	237	101	0	149	0	15	0	2	0	132	10.9	82	2	0
Barley and products	0	1	0	0	1	0	0	0	0	1	0	0.0	0	0	0
Maize and products	424	146	80	0	490	0	38	7	10	2	434	35.9	326	9	4
Rye and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oats and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Millet and products	2	1	0	0	3	0	0	0	0	0	3	0.2	2	0	0
Sorghum and products	155	49	1	0	203	36	6	3	4	0	154	12.8	114	3	1
Rice & Prod (Milled Equivalent)	114	213	84	0	243	0	8	2	1	0	231	19.1	127	2	0
Cereals, Others & Products	5	0	0	0	5	0	0	0	0	0	5	0.4	4	0	0
Starchy roots	**3,398**	**103**	**97**	**0**	**3,405**	**0**	**158**	**0**	**137**	**6**	**3104**	**256.7**	**650**	**8**	**1**
Potatoes and products	916	32	19	0	929	0	35	0	137	1	757	62.6	122	3	0
Cassava and products	1,127	67	77	0	1,118	0	34	0	0	3	1,081	89.4	257	1	0
Sweet potatoes	1,187	3	1	0	1,189	0	72	0	0	2	1,115	92.2	242	3	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Yams	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Roots & Tubers, Other & Prod.	168	0	0	0	168	0	17	0	0	0	151	12.5	29	1	0
Sugar crops	**134**	**0**	**0**	**0**	**134**	**123**	**0**	**0**	**0**	**0**	**11**	**0.9**	**1**	**0**	**0**
Sugar cane	134	0	0	0	134	123	0	0	0	0	11	0.9	1	0	0
Sugar Beets	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Sweeteners	**15**	**117**	**20**	**0**	**112**	**0**	**0**	**0**	**0**	**0**	**111**	**9.2**	**87**	**0**	**0**
Sugar non-centrifugal	0	2	2	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Prod. (raw equivalent)	15	114	18	0	110	0	0	0	0	0	110	9.1	86	0	0
Sweeteners, other & prod.	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Honey	0	1	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pulses	**501**	**42**	**54**	**0**	**489**	**0**	**16**	**0**	**58**	**1**	**415**	**34.3**	**315**	**22**	**1**
Beans, Dry & Products	486	13	24	0	474	0	15	0	58	1	400	33.1	304	21	1
Peas, Dry & Products	15	0	0	0	15	0	1	0	0	0	14	1.2	11	1	0
Pulses, Other and products	0	29	29	0	0	0	0	0	0	0	0	0.0	0	0	0
Treenuts	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Nuts and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops	**45**	**25**	**2**	**0**	**68**	**0**	**3**	**0**	**3**	**1**	**61**	**5.1**	**49**	**3**	**3**
Soyabeans & Products	23	8	1	0	30	0	1	0	0	0	29	2.4	22	2	1
Groundnuts (Shelled Eq)	22	17	1	0	38	0	2	0	3	0	33	2.7	27	1	2

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Sunflower seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Rape and Mustardseed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Coconuts - Incl Copra	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesame seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernels	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olives (including preserved)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops, Other	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Vegetable oils	**0**	**134**	**64**	**0**	**70**	**0**	**0**	**0**	**0**	**7**	**64**	**5.3**	**127**	**0**	**15**
Soyabean Oil	0	3	0	0	3	0	0	0	0	0	3	0.3	6	0	1
Groundnut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sunflowerseed Oil	0	14	5	0	9	0	0	0	0	0	9	0.7	18	0	2
Rape and Mustard Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernel Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palm Oil	0	93	37	0	56	0	0	0	0	5	51	4.2	103	0	12
Coconut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesameseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olive & Residue Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Maize Germ Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops Oil, Other	0	24	22	0	2	0	0	0	0	2	0	0.0	0	0	0
Vegetables	**563**	**9**	**11**	**0**	**561**	**0**	**0**	**0**	**0**	**2**	**559**	**46.2**	**28**	**1**	**0**
Tomatoes and products	108	1	2	0	107	0	0	0	0	0	106	8.8	5	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Onions, Dry	14	0	0	0	14	0	0	0	0	1	14	1.1	1	0	0
Vegetables, Other & Prod.	441	8	9	0	440	0	0	0	0	1	439	36.3	22	1	0
Fruits (Excluding Wine)	**1,778**	**17**	**5**	**0**	**1,791**	**777**	**68**	**0**	**0**	**2**	**943**	**78.0**	**150**	**2**	**0**
Oranges, Tang-Mand & Prod.	0	8	2	0	5	0	0	0	0	0	5	0.4	0	0	0
Lemons, Limes and products	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapefruit and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Citrus Fruit nes & prod	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Bananas	1,010	0	0	0	1,010	777	0	0	0	0	232	19.2	32	1	0
Plantains	760	1	0	0	760	0	68	0	0	1	691	57.2	117	1	0
Apples and products	0	1	0	0	1	0	0	0	0	0	1	0.0	0	0	0
Pineapples and products	0	1	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Dates	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapes and products (excl wine)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Fruits, Other & Products	9	6	1	0	13	0	0	0	0	0	13	1.1	1	0	0
Stimulants	**160**	**3**	**57**	**0**	**105**	**0**	**0**	**0**	**0**	**0**	**105**	**8.7**	**10**	**2**	**0**
Coffee and products	29	2	26	0	5	0	0	0	0	0	5	0.4	1	0	0
Cocoa Beans and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Tea (including mate)	131	0	31	0	100	0	0	0	0	0	100	8.3	9	2	0
Spices	**1**	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	**0.3**	**3**	**0**	**0**
Pepper	1	0	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pimento	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cloves	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
												PER YEAR FOOD	PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food		Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Spices, other	0	3	0	0	3	0	0	0	0	0	3	0.2	2	0	0
Alcoholic beverages	**485**	**27**	**5**	**0**	**507**	**0**	**0**	**0**	**0**	**2**	**504**	**41.7**	**52**	**0**	**0**
Wine	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Barley Beer	0	7	1	0	6	0	0	0	0	0	6	0.5	1	0	0
Beverages, fermented	485	16	1	0	500	0	0	0	0	2	499	41.2	51	0	0
Beverages, alcoholic	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Alcohol, non food	0	2	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Meat	**45**	**1**	**3**	**0**	**43**	**0**	**0**	**0**	**0**	**1**	**42**	**3.5**	**18**	**1**	**1**
Meat & Products, Bovine	33	1	0	0	34	0	0	0	0	0	33	2.7	14	1	1
Meat & Prod, Sheep & Goat	5	0	0	0	5	0	0	0	0	0	5	0.4	2	0	0
Meat & Products, Pig	3	0	3	0	1	0	0	0	0	0	1	0.1	1	0	0
Meat & Products, Poultry	2	0	0	0	2	0	0	0	0	0	2	0.2	1	0	0
Meat & Products, Other Anim.	1	0	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Offals	**8**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**8**	**0.6**	**2**	**0**	**0**
Offals, Edible	8	0	0	0	8	0	0	0	0	0	8	0.6	2	0	0
Animal fats	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0.1**	**2**	**0**	**0**
Fats, Animals, Raw	1	0	0	0	1	0	0	0	0	0	1	0.1	2	0	0
Milk - Excluding Butter	**73**	**34**	**21**	**0**	**87**	**1**	**3**	**0**	**0**	**0**	**82**	**6.8**	**12**	**1**	**1**
Milk & Prod (Excluding Butter)	73	34	21	0	87	1	3	0	0	0	82	6.8	12	1	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Eggs	**6**	**0**	**1**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**4**	**0.4**	**1**	**0**	**0**
Eggs and products	6	0	1	0	5	0	0	0	0	0	4	0.4	1	0	0
Fish & sea food	**7**	**18**	**0**	**0**	**25**	**0**	**0**	**0**	**0**	**0**	**25**	**2.0**	**6**	**1**	**0**
Miscellaneous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Infant food	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

RWANDA FOOD BALANCE SHEETS 2019 Population ('000): 12 374

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY Calories	PER DAY Proteins	PER DAY Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Grand total													**2,136**	**55**	**27**
Vegetal prod.													**2,095**	**52**	**25**
Animal prod.													**41**	**3**	**2**
Cereals (excl. beer)	**734**	**502**	**260**	**-67**	**1042**	**31**	**59**	**11**	**17**	**5**	**920**	**74**	**613**	**15**	**4**
Wheat and products	16	213	114	-36	151	0	14	0	2	0	134	10.8	81	2	0
Barley and products	0	6	4	0	2	0	0	0	0	2	0	0.0	0	0	0
Maize and products	421	81	57	-29	474	0	33	7	9	2	422	34.1	309	8	3
Rye and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oats and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Millet and products	1	0	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Sorghum and products	160	28	1	0	187	31	6	3	5	0	143	11.5	103	3	1
Rice & Prod (Milled Equivalent)	132	173	84	-3	223	0	6	1	1	0	216	17.4	116	2	0
Cereals, Others & Products	4	0	0	0	4	0	0	0	0	0	4	0.3	3	0	0
Starchy roots	**3,575**	**78**	**152**	**0**	**3,501**	**0**	**163**	**0**	**134**	**4**	**3,199**	**258.5**	**653**	**8**	**1**
Potatoes and products	973	11	17	0	967	0	39	0	134	1	793	64.1	125	3	0
Cassava and products	1,182	67	134	0	1,115	0	31	0	0	1	1,083	87.5	251	1	0
Sweet potatoes	1,248	0	1	0	1,247	0	76	0	0	2	1,169	94.5	248	3	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Yams	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Roots & Tubers, Other & Prod.	172	0	0	0	172	0	17	0	0	0	155	12.5	29	1	0
Sugar crops	**107**	**0**	**1**	**0**	**107**	**96**	**0**	**0**	**0**	**0**	**11**	**0.9**	**1**	**0**	**0**
Sugar cane	107	0	1	0	107	96	0	0	0	0	11	0.9	1	0	0
Sugar Beets	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Sweeteners	**12**	**148**	**45**	**0**	**115**	**0**	**0**	**0**	**0**	**1**	**114**	**9.2**	**88**	**0**	**0**
Sugar non-centrifugal	0	2	2	0	1	0	0	0	0	1	0	0.0	0	0	0
Sugar & Prod. (raw equivalent)	11	144	43	0	113	0	0	0	0	0	113	9.1	87	0	0
Sweeteners, other & prod.	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Honey	0	1	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pulses	**500**	**28**	**57**	**0**	**471**	**0**	**16**	**0**	**61**	**1**	**394**	**31.8**	**292**	**20**	**1**
Beans, Dry & Products	484	8	37	0	455	0	15	0	61	1	379	30.7	281	19	1
Peas, Dry & Products	15	0	0	0	15	0	1	0	0	0	14	1.2	11	1	0
Pulses, Other and products	0	20	20	0	0	0	0	0	0	0	0	0.0	0	0	0
Treenuts	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Nuts and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops	**44**	**38**	**1**	**0**	**81**	**0**	**3**	**0**	**3**	**0**	**74**	**6.0**	**57**	**4**	**4**
Soyabeans & Products	25	9	0	0	33	0	2	0	0	0	31	2.5	23	3	1
Groundnuts (Shelled Eq)	20	29	1	0	47	0	1	0	3	0	43	3.5	34	1	3

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
													PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Sunflower seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Rape and Mustardseed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Coconuts - Incl Copra	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesame seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernels	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olives (including preserved)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops, Other	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Vegetable oils	**0**	**130**	**55**	**0**	**74**	**0**	**0**	**0**	**0**	**6**	**68**	**5.5**	**133**	**0**	**15**
Soyabean Oil	0	5	0	0	5	0	0	0	0	0	5	0.4	10	0	1
Groundnut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sunflowerseed Oil	0	10	3	0	7	0	0	0	0	0	7	0.6	14	0	2
Rape and Mustard Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernel Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	1	0	0
Palm Oil	0	99	39	0	60	0	0	0	0	5	55	4.5	108	0	12
Coconut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesameseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olive & Residue Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Maize Germ Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops Oil, Other	0	14	13	0	1	0	0	0	0	1	0	0.0	0	0	0
Vegetables	**552**	**5**	**10**	**0**	**548**	**0**	**0**	**0**	**0**	**1**	**547**	**44.2**	**28**	**1**	**0**
Tomatoes and products	106	1	2	0	105	0	0	0	0	1	104	8.4	5	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Onions, Dry	41	0	0	0	41	0	0	0	0	0	41	3.3	4	0	0
Vegetables, Other & Prod.	406	4	7	0	403	0	0	0	0	0	402	32.5	19	1	0
Fruits (Excluding Wine)	**1,862**	**13**	**5**	**0**	**1,870**	**794**	**74**	**0**	**0**	**2**	**1,000**	**80.8**	**158**	**2**	**0**
Oranges, Tang-Mand & Prod.	0	6	2	0	3	0	0	0	0	0	3	0.2	0	0	0
Lemons, Limes and products	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapefruit and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Citrus Fruit nes & prod	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Bananas	1,032	0	0	0	1,032	794	0	0	0	0	237	19.2	32	1	0
Plantains	819	0	0	0	819	0	74	0	0	1	744	60.1	124	1	0
Apples and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Pineapples and products	0	1	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Dates	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapes and products (excl wine)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Fruits, Other & Products	11	6	2	0	16	0	0	0	0	0	15	1.2	2	0	0
Stimulants	**165**	**3**	**58**	**0**	**111**	**0**	**0**	**0**	**0**	**0**	**111**	**9.0**	**10**	**2**	**0**
Coffee and products	31	3	26	0	8	0	0	0	0	0	8	0.6	1	0	0
Cocoa Beans and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Tea (including mate)	134	0	31	0	103	0	0	0	0	0	103	8.3	9	2	0
Spices	**6**	**3**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**8**	**0.7**	**5**	**0**	**0**
Pepper	6	0	0	0	6	0	0	0	0	0	6	0.5	3	0	0
Pimento	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cloves	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Spices, other	0	3	0	0	3	0	0	0	0	0	3	0.2	2	0	0
Alcoholic beverages	**482**	**13**	**6**	**0**	**489**	**0**	**0**	**0**	**0**	**1**	**488**	**39.4**	**49**	**0**	**0**
Wine	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Barley Beer	0	3	2	0	0	0	0	0	0	0	0	0.0	0	0	0
Beverages, fermented	482	7	1	0	488	0	0	0	0	1	487	39.4	49	0	0
Beverages, alcoholic	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Alcohol, non food	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Meat	**44**	**1**	**3**	**0**	**42**	**0**	**0**	**0**	**0**	**1**	**42**	**3.4**	**17**	**1**	**1**
Meat & Products, Bovine	31	1	0	0	31	0	0	0	0	0	31	2.5	13	1	1
Meat & Prod, Sheep & Goat	5	0	0	0	5	0	0	0	0	0	5	0.4	1	0	0
Meat & Products, Pig	4	0	2	0	2	0	0	0	0	0	2	0.1	2	0	0
Meat & Products, Poultry	3	0	0	0	3	0	0	0	0	0	3	0.3	1	0	0
Meat & Products, Other Anim.	1	0	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Offals	**7**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**7**	**0.6**	**2**	**0**	**0**
Offals, Edible	7	0	0	0	7	0	0	0	0	0	7	0.6	2	0	0
Animal fats	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0.1**	**2**	**0**	**0**
Fats, Animals, Raw	1	0	0	0	1	0	0	0	0	0	1	0.1	2	0	0
Milk - Excluding Butter	**82**	**35**	**16**	**0**	**101**	**0**	**4**	**0**	**0**	**0**	**96**	**7.8**	**13**	**1**	**1**
Milk & Prod (Excluding Butter)	82	35	16	0	101	0	4	0	0	0	96	7.8	13	1	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Eggs	**6**	**0**	**2**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**4**	**0.3**	**1**	**0**	**0**
Eggs and products	6	0	2	0	5	0	0	0	0	0	4	0.3	1	0	0
Fish & sea food	**7**	**17**	**0**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**23**	**1.8**	**6**	**1**	**0**
Miscellaneous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Infant food	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

RWANDA FOOD BALANCE SHEETS 2020

Population ('000): 12 663

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
													PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Grand total													**2,184**	**55**	**29**
Vegetal prod.													**2,145**	**52**	**27**
Animal prod.													**39**	**3**	**2**
Cereals (excl. beer)	**753**	**624**	**234**	**0**	**1,143**	**34**	**56**	**12**	**17**	**4**	**1,019**	**80**	**660**	**17**	**5**
Wheat and products	13	242	105	0	149	0	16	0	2	0	131	10.4	78	2	0
Barley and products	0	22	21	0	1	0	0	0	0	1	0	0.0	0	0	0
Maize and products	449	78	19	0	508	0	26	7	10	2	462	36.5	330	9	4
Rye and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oats and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Millet and products	1	0	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Sorghum and products	170	26	0	0	197	34	6	3	5	0	149	11.7	105	3	1
Rice & Prod (Milled Equivalent)	117	255	89	0	283	0	8	2	1	0	271	21.4	143	3	0
Cereals, Others & Products	3	0	0	0	3	0	0	0	0	0	3	0.3	3	0	0
Starchy roots	**3,602**	**84**	**186**	**0**	**3,501**	**0**	**169**	**0**	**130**	**1**	**3,200**	**252.7**	**646**	**7**	**1**
Potatoes and products	859	3	8	0	853	0	34	0	130	0	688	54.3	106	2	0
Cassava and products	1,280	81	177	0	1,184	0	38	0	0	0	1,145	90.4	260	1	0
Sweet potatoes	1,276	0	0	0	1,275	0	78	0	0	0	1,197	94.6	249	3	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY Calories	PER DAY Proteins	PER DAY Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Yams	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Roots & Tubers, Other & Prod.	188	0	0	0	188	0	19	0	0	0	169	13.4	31	1	0
Sugar crops	**120**	**0**	**0**	**0**	**120**	**108**	**0**	**0**	**0**	**0**	**12**	**0.9**	**1**	**0**	**0**
Sugar cane	120	0	0	0	120	108	0	0	0	0	12	0.9	1	0	0
Sugar Beets	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Sweeteners	**13**	**147**	**28**	**0**	**133**	**0**	**0**	**0**	**0**	**0**	**132**	**10.4**	**101**	**0**	**0**
Sugar non-centrifugal	0	4	3	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Prod. (raw equivalent)	13	143	25	0	131	0	0	0	0	0	131	10.3	100	0	0
Sweeteners, other & prod.	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Honey	0	1	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pulses	**453**	**27**	**24**	**0**	**455**	**0**	**8**	**0**	**67**	**1**	**379**	**29.9**	**275**	**19**	**1**
Beans, Dry & Products	439	12	10	0	440	0	7	0	67	0	366	28.9	265	18	1
Peas, Dry & Products	14	0	0	0	14	0	1	0	0	0	13	1.0	10	1	0
Pulses, Other and products	0	15	14	0	1	0	0	0	0	1	0	0.0	0	0	0
Treenuts	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Nuts and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops	**40**	**46**	**2**	**0**	**84**	**0**	**3**	**0**	**3**	**1**	**79**	**6.2**	**60**	**4**	**4**
Soyabeans & Products	24	14	0	0	38	0	2	0	0	1	36	2.8	26	3	1
Groundnuts (Shelled Eq)	16	32	2	0	46	0	1	0	3	0	43	3.4	34	1	3

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
												PER YEAR FOOD	PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food		Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Sunflower seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Rape and Mustardseed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Coconuts - Incl Copra	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesame seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernels	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olives (including preserved)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops, Other	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Vegetable oils	**0**	**133**	**48**	**13**	**73**	**0**	**0**	**0**	**0**	**6**	**66**	**5.2**	**127**	**0**	**15**
Soyabean Oil	0	3	0	0	3	0	0	0	0	0	3	0.2	6	0	1
Groundnut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sunflowerseed Oil	0	10	2	0	8	0	0	0	0	0	8	0.7	16	0	2
Rape and Mustard Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernel Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	1	0	0
Palm Oil	0	107	34	13	60	0	0	0	0	5	54	4.3	104	0	12
Coconut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesameseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olive & Residue Oil	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Maize Germ Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops Oil, Other	0	12	11	0	1	0	0	0	0	1	0	0.0	0	0	0
Vegetables	**605**	**4**	**5**	**0**	**605**	**0**	**0**	**0**	**0**	**2**	**603**	**47.6**	**30**	**1**	**0**
Tomatoes and products	91	2	2	0	91	0	0	0	0	2	89	7.1	4	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Onions, Dry	34	0	0	0	34	0	0	0	0	0	34	2.7	3	0	0
Vegetables, Other & Prod.	480	2	3	0	479	0	0	0	0	0	479	37.9	23	1	0
Fruits (Excluding Wine)	**2,045**	**11**	**6**	**0**	**2,050**	**861**	**82**	**0**	**0**	**1**	**1,106**	**87.3**	**170**	**2**	**1**
Oranges, Tang-Mand & Prod.	0	4	2	0	2	0	0	0	0	0	2	0.2	0	0	0
Lemons, Limes and products	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapefruit and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Citrus Fruit nes & prod	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Bananas	1,119	0	0	0	1,119	861	0	0	0	0	257	20.3	33	1	0
Plantains	913	0	0	0	913	0	82	0	0	0	831	65.6	135	1	1
Apples and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Pineapples and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Dates	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapes and products (excl wine)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Fruits, Other & Products	13	5	3	0	15	0	0	0	0	0	15	1.2	2	0	0
Stimulants	**166**	**1**	**49**	**0**	**119**	**0**	**0**	**0**	**0**	**0**	**119**	**9.4**	**10**	**2**	**0**
Coffee and products	26	1	18	0	10	0	0	0	0	0	10	0.8	1	0	0
Cocoa Beans and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Tea (including mate)	140	0	31	0	109	0	0	0	0	0	109	8.6	9	2	0
Spices	**4**	**4**	**1**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**7**	**0.6**	**5**	**0**	**0**
Pepper	4	0	1	0	3	0	0	0	0	0	3	0.2	2	0	0
Pimento	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cloves	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Spices, other	0	4	0	0	4	0	0	0	0	0	4	0.3	3	0	0
Alcoholic beverages	**523**	**14**	**5**	**0**	**532**	**0**	**0**	**0**	**0**	**1**	**531**	**41.9**	**52**	**0**	**0**
Wine	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Barley Beer	0	3	2	0	1	0	0	0	0	0	1	0.1	0	0	0
Beverages, fermented	523	7	0	0	530	0	0	0	0	0	530	41.8	52	0	0
Beverages, alcoholic	0	3	3	0	0	0	0	0	0	0	0	0.0	0	0	0
Alcohol, non food	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Meat	**42**	**1**	**1**	**0**	**41**	**0**	**0**	**0**	**0**	**0**	**41**	**3.3**	**16**	**1**	**1**
Meat & Products, Bovine	28	0	0	0	28	0	0	0	0	0	28	2.2	11	1	1
Meat & Prod, Sheep & Goat	5	0	0	0	5	0	0	0	0	0	5	0.4	1	0	0
Meat & Products, Pig	5	0	1	0	4	0	0	0	0	0	4	0.3	3	0	0
Meat & Products, Poultry	3	0	0	0	3	0	0	0	0	0	3	0.3	1	0	0
Meat & Products, Other Anim.	1	0	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Offals	**7**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**6**	**0.5**	**1**	**0**	**0**
Offals, Edible	7	0	0	0	6	0	0	0	0	0	6	0.5	1	0	0
Animal fats	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0.1**	**2**	**0**	**0**
Fats, Animals, Raw	1	0	0	0	1	0	0	0	0	0	1	0.1	2	0	0
Milk - Excluding Butter	**92**	**29**	**15**	**0**	**107**	**0**	**4**	**0**	**0**	**0**	**102**	**8.1**	**14**	**1**	**1**
Milk & Prod (Excluding Butter)	92	29	15	0	107	0	4	0	0	0	102	8.1	14	1	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Eggs	**6**	**0**	**1**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**5**	**0.4**	**1**	**0**	**0**
Eggs and products	6	0	1	0	5	0	0	0	0	0	5	0.4	1	0	0
Fish & sea food	**6**	**15**	**1**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**20**	**1.5**	**5**	**1**	**0**
Miscellaneous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Infant food	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

RWANDA FOOD BALANCE SHEETS 2021

Population ('000): 12 956

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY Calories	PER DAY Proteins	PER DAY Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Grand total													**2,206**	**56**	**28**
Vegetal prod.													**2,166**	**53**	**26**
Animal prod.													**40**	**3**	**2**
Cereals (excl. beer)	**811**	**576**	**286**	**-22**	**1,122**	**38**	**61**	**13**	**18**	**4**	**989**	**76**	**627**	**16**	**4**
Wheat and products	14	231	120	-22	147	1	17	0	2	0	127	9.8	73	2	0
Barley and products	0	3	1	0	2	0	0	0	0	2	0	0.0	0	0	0
Maize and products	483	68	66	0	485	0	28	8	10	2	437	33.7	306	8	3
Rye and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oats and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Millet and products	1	0	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Sorghum and products	178	33	1	0	211	37	6	3	5	0	160	12.3	111	3	1
Rice & Prod (Milled Equivalent)	132	240	98	0	274	0	9	2	1	0	261	20.1	134	3	0
Cereals, Others & Products	3	0	0	0	3	0	0	0	0	0	3	0.3	2	0	0
Starchy roots	**3,788**	**63**	**210**	**0**	**3,640**	**0**	**178**	**0**	**141**	**12**	**3,309**	**255.4**	**651**	**7**	**1**
Potatoes and products	938	1	28	0	911	0	38	0	141	0	732	56.5	110	2	0
Cassava and products	1,320	62	181	0	1,201	0	40	0	0	11	1,150	88.8	255	1	0
Sweet potatoes	1,329	0	1	0	1,328	0	81	0	0	0	1,246	96.2	253	3	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Yams	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Roots & Tubers, Other & Prod.	201	0	1	0	200	0	20	0	0	0	180	13.9	33	1	0
Sugar crops	**90**	**0**	**0**	**0**	**90**	**78**	**0**	**0**	**0**	**0**	**12**	**0.9**	**1**	**0**	**0**
Sugar cane	90	0	0	0	90	78	0	0	0	0	12	0.9	1	0	0
Sugar Beets	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sugar & Sweeteners	**10**	**205**	**52**	**0**	**162**	**0**	**0**	**0**	**0**	**1**	**162**	**12.5**	**121**	**0**	**0**
Sugar non-centrifugal	0	14	14	0	1	0	0	0	0	1	0	0.0	0	0	0
Sugar & Prod. (raw equivalent)	9	190	39	0	160	0	0	0	0	0	160	12.4	120	0	0
Sweeteners, other & prod.	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Honey	0	1	0	0	1	0	0	0	0	0	1	0.1	1	0	0
Pulses	**508**	**24**	**32**	**0**	**499**	**0**	**8**	**0**	**72**	**0**	**419**	**32.3**	**297**	**21**	**1**
Beans, Dry & Products	492	6	15	0	484	0	7	0	72	0	404	31.2	286	20	1
Peas, Dry & Products	16	0	0	0	16	0	1	0	0	0	15	1.1	11	1	0
Pulses, Other and products	0	17	17	0	0	0	0	0	0	0	0	0.0	0	0	0
Treenuts	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Nuts and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops	**44**	**43**	**4**	**0**	**83**	**0**	**3**	**0**	**3**	**1**	**77**	**6.0**	**57**	**4**	**4**
Soyabeans & Products	27	10	1	0	36	0	2	0	0	1	34	2.6	24	3	1
Groundnuts (Shelled Eq)	17	33	3	0	47	0	1	0	3	0	43	3.3	33	1	3

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
												PER YEAR FOOD	PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food		Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Sunflower seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Rape and Mustardseed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Coconuts - Incl Copra	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesame seed	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernels	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olives (including preserved)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops, Other	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Vegetable oils	**0**	**142**	**51**	**17**	**74**	**0**	**0**	**0**	**0**	**7**	**67**	**5.2**	**125**	**0**	**15**
Soyabean Oil	0	3	0	0	3	0	0	0	0	0	3	0.2	6	0	1
Groundnut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sunflowerseed Oil	0	9	1	0	8	0	0	0	0	0	8	0.6	15	0	2
Rape and Mustard Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Palmkernel Oil	0	1	0	0	1	0	0	0	0	0	1	0.0	1	0	0
Palm Oil	0	120	42	17	61	0	0	0	0	6	55	4.3	103	0	12
Coconut Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Sesameseed Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Olive & Residue Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Maize Germ Oil	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Oilcrops Oil, Other	0	9	8	0	1	0	0	0	0	1	0	0.0	0	0	0
Vegetables	**635**	**11**	**23**	**0**	**623**	**0**	**0**	**0**	**0**	**1**	**622**	**48.0**	**30**	**1**	**0**
Tomatoes and products	94	1	9	0	86	0	0	0	0	1	85	6.6	4	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
													PER DAY		
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Onions, Dry	37	0	0	0	37	0	0	0	0	0	37	2.9	3	0	0
Vegetables, Other & Prod.	504	9	14	0	500	0	0	0	0	0	500	38.6	23	1	0
Fruits (Excluding Wine)	**2,158**	**19**	**10**	**0**	**2,166**	**904**	**87**	**0**	**0**	**1**	**1,174**	**90.6**	**176**	**2**	**1**
Oranges, Tang-Mand & Prod.	0	8	3	0	4	0	0	0	0	0	4	0.3	0	0	0
Lemons, Limes and products	0	2	2	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapefruit and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Citrus Fruit nes & prod	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Bananas	1,175	0	0	0	1,175	904	0	0	0	0	270	20.9	34	1	0
Plantains	969	0	0	0	969	0	87	0	0	0	882	68.1	140	1	1
Apples and products	0	1	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Pineapples and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Dates	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Grapes and products (excl wine)	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Fruits, Other & Products	14	8	5	0	17	0	0	0	0	0	16	1.3	2	0	0
Stimulants	**176**	**11**	**59**	**0**	**128**	**0**	**0**	**0**	**0**	**0**	**128**	**9.8**	**10**	**2**	**0**
Coffee and products	26	11	20	0	17	0	0	0	0	0	17	1.3	1	0	0
Cocoa Beans and products	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Tea (including mate)	150	0	39	0	111	0	0	0	0	0	111	8.5	9	2	0
Spices	**8**	**8**	**1**	**0**	**14**	**0**	**0**	**0**	**0**	**0**	**14**	**1.1**	**9**	**0**	**0**
Pepper	8	0	1	0	6	0	0	0	0	0	6	0.5	4	0	0
Pimento	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0
Cloves	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Spices, other	0	7	0	0	7	0	0	0	0	0	7	0.6	5	0	0
Alcoholic beverages	**552**	**23**	**10**	**0**	**565**	**0**	**0**	**0**	**0**	**1**	**564**	**43.5**	**54**	**0**	**0**
Wine	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Barley Beer	0	5	4	0	1	0	0	0	0	0	1	0.1	0	0	0
Beverages, fermented	552	12	1	0	563	0	0	0	0	0	563	43.4	54	0	0
Beverages, alcoholic	0	4	3	0	0	0	0	0	0	0	0	0.0	0	0	0
Alcohol, non food	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Meat	**43**	**2**	**3**	**0**	**42**	**0**	**0**	**0**	**0**	**0**	**41**	**3.2**	**17**	**1**	**1**
Meat & Products, Bovine	28	1	0	0	28	0	0	0	0	0	28	2.1	11	1	1
Meat & Prod, Sheep & Goat	6	0	0	0	5	0	0	0	0	0	5	0.4	2	0	0
Meat & Products, Pig	5	0	1	0	4	0	0	0	0	0	4	0.3	3	0	0
Meat & Products, Poultry	4	2	2	0	4	0	0	0	0	0	4	0.3	1	0	0
Meat & Products, Other Anim.	1	0	0	0	1	0	0	0	0	0	1	0.1	0	0	0
Offals	**7**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**7**	**0.5**	**1**	**0**	**0**
Offals, Edible	7	0	0	0	7	0	0	0	0	0	7	0.5	1	0	0
Animal fats	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0.1**	**2**	**0**	**0**
Fats, Animals, Raw	1	0	0	0	1	0	0	0	0	0	1	0.1	2	0	0
Milk - Excluding Butter	**98**	**37**	**28**	**0**	**107**	**0**	**5**	**0**	**0**	**0**	**102**	**7.9**	**14**	**1**	**1**
Milk & Prod (Excluding Butter)	98	37	28	0	107	0	5	0	0	0	102	7.9	14	1	1

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILIZATION (1000 MT)						PER CAPUT SUPPLY			
	Prod.	Imports	Exports	Stock Changes	Total Domestic Supply	Processed	Loss	Feed	Seed	Other Uses	Food	PER YEAR FOOD	PER DAY		
													Calories	Proteins	Fats
	1000 Metric Tons											Kg	Units	Grams	Grams
Eggs	**7**	**0**	**2**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**5**	**0.4**	**1**	**0**	**0**
Eggs and products	7	0	2	0	5	0	0	0	0	0	5	0.4	1	0	0
Fish & sea food	**7**	**13**	**0**	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**19**	**1.5**	**5**	**1**	**0**
Miscellaneous	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**
Infant food	0	1	1	0	0	0	0	0	0	0	0	0.0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0

Annex 1.4. List of members of the Technical Working Group on FBS

No	Area	Name of Institution	Role	Contact details (Name, function, email, phone)
1	National Consultancy		National Consultant	Baba-Ali Mwango bwpoverty@gmail.com Phone: (+250) 788412590
2	National Strategy Coordinator for Agricultural Statistics	NISR	FBS_TWG Chair	MWIZERWA Jean Claude, Director of Economic statistics; Email: claude.mwizerwa@statistics.gov.rw; Phone: (+250) 788687078
3	National Strategy Coordinator for Agricultural Statistics Alternate	MINAGRI	FBS_TWG co-Chair	INGABIRE Chantal, DG Planning ; Email: cingabire@minagri.gov.rw; Phone: (+250)788443133 Phone: (+250) 788412590
4	Trade Statistics	NISR	Member,	NZASINGIZIMANA Tharcisse, Team leader/ trade statistics; Email: tharcisse.nzasingizimana@statistics.gov.rw; Phone: (+250)788671205
5	National Account	NISR	Member,	KAYITARE Ivan Patrick, Team leader/ National accounts; Email: patrick.kayitare@statistics.gov.rw; Phone: (+250)788511264
6	Agriculture Statistics	NISR	Member, and FBS Core Team Member	ABAYISENGA Aimable, Team leader/Agriculture & environmental statistics; Email: aimable.abayisenga@statistics.gov.rw; Phone: (+250)783452905
7	Livestock and Fisheries Statistics	NISR	Member, and FBS Core Team Member	MUVUNYI Issa, Statistician for Livestock and Fisheries Statistics; Email: issa.muvunyi@statistics.gov.rw Phone: (+250)788896654
8	Food security and Nutrition	NISR	Member and FBS Core Team Member,	MUTEBUTSI Alexis, SPIU Research assistant; Email: alexis.mutebutsi@statistics.gov.rw; Phone: (+250)788591696
9	Agriculture Value Chain	MINAGRI	Member	MUTABAZI Egide, Crop products Supply chain and market analyst; Email: emutabazi@minagri.gov.rw; Phone: (+250)788744138
11	Crop data	MINAGRI	Member	DUSHIMAYEZU Bertrand, agriculture data specialist; Email: bdushimayezu@minagri.gov.rw; Phone: (+250)788658304

No	Area	Name of Institution	Role	Contact details (Name, function, email, phone)
12	Livestock	RAB	Member	MUNYEMANA Jacques, Data management specialist; Email: jacques.munyemana@rab.gov.rw; Phone: (+250)783134624
13	Fisheries	RAB	Member	Cecile UWIZEYIMANA, Fish Breeding, Physiology, and Reproduction Research Fellow; Email: cecile.uwizeyimana@rab.gov.rw; Phone: (+250)788837179
14	Trade statistics	MINICOM	Member	UKWIZAGIRA Jean Baptiste, Trade Statistician; Email: jbukwizagira@minicom.gov.rw; Phone: (+250)788666097

The Republic of Rwanda

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