

Institutionalizing National Food Balance Sheet



Case of Zambia

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Food Trade and Food Security

Zambia has been dealing with the nexus between food security and food trade since the 1991 food riots that threatened to put an end to Kaunda's presidency. Since then, the country has been allocating about US\$1 million to conducting a Crop Forecast Survey (CFS) every year. Data from the survey produce data on food availability and food requirements. The data from CFS is used by grain traders and millers to negotiate supply contracts for exports and imports.

National Food Balance Sheet

The National Food Balance Sheet consists of 5 elements, including (1) availability, (2) Requirements, (3) Surplus/deficit, (4) potential commercial export, and (5) Food aid import requirements. The development of the Zambian National Balance Sheet has been running since 1988 by a team trained by FAO and MSU.

Below is a sample of the Zambian National Balance Sheet.

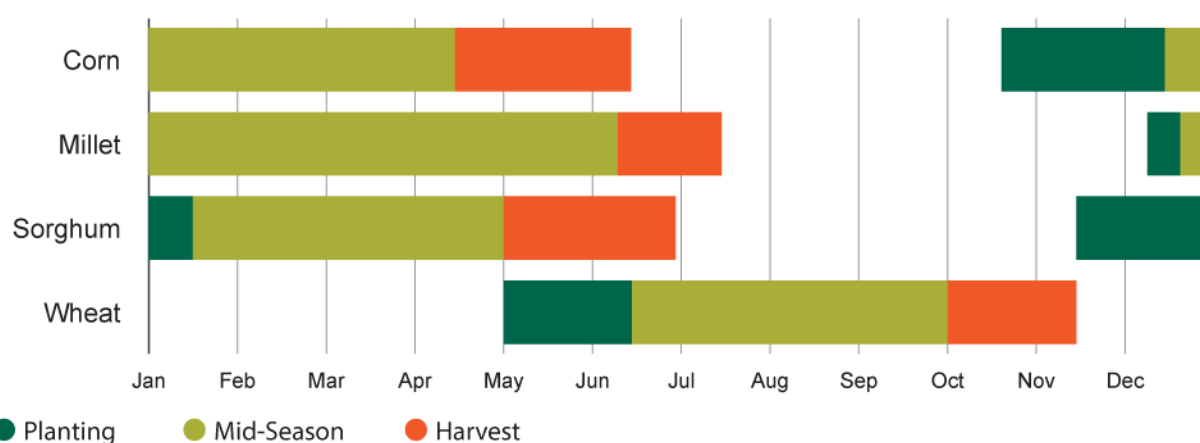
Table 1: National Food Balance Sheet for Zambia for the 2017/2018 Agricultural Marketing Season

	Maize	Paddy Rice	Wheat (Preliminary)	Sorghum & Millet	Sweet and Irish Potatoes	Cassava flour	Total (maize equivalent)
A. Availability							
i. Opening stocks (May 1, 2017)	569,317	353	54,522	944	0	13	624,321
ii. Total production (2016/17)	3,606,549	38,423	193,713	49,903	238,426	923,796	4,816,094
Total availability	4,175,866	38,776	248,235	50,847	238,426	923,808	5,440,415
B. Requirements							
i. Staple food requirements:							
Human consumption	1,632,348	73,855	385,314	45,852	226,505	763,313	2,908,535
Strategic Reserve Stocks (net)	500,000	0	0	0	0	0	500,000
ii. Industrial requirements:							
Stockfeed	270,807	0	0	0	0	0	270,807
Breweries	121,275	0	0	0	0	0	121,275
Grain retained for other users	92,592	3,000	0	2,500	0	0	97,933

	Maize	Paddy Rice	Wheat (Preliminary)	Sorghum & Millet	Sweet and Irish Potatoes	Cassava flour	Total (maize equivalent)
iii. Losses	180,327	1,921	9,686	2,495	11,921	46,190	240,805
iv. Structural cross-border trade	200,000						200,000
Total requirements	2,997,350	78,776	395,000	50,847	238,426	809,503	4,339,354
C. Surplus/deficit (A-B)	1,178,516	-40,000	-146,765	0	0	114,305	1,101,060
D. Potential Commercial exports	-1,178,516	40,000	146,765	0	0	0	0
E. Food aid import requirements	0	0	0	0	0	0	0

Activities that contribute to the development of the Zambian National Balance Sheet start in January right after farmers have planted.

Zambia Crop Calendar



Source: FAO/GIEWS

Figure 1: Zambia Crop Calendar


In addition to Crop Forecast Survey, the National Food Balance Sheet also uses data from holders of food stocks and various users of food-grade commodities such as breweries and animal feed manufacturers. The revenue authority also provides data on cross-border food trade flows. The reference period of Zambia's FBS stretches from May 1 of the current year to April 30 of the following year and shows the impending balance between the supply and demand for food.

Below are the steps that Zambia takes every year to develop the National Food Balance Sheet:

Step 1: Crop Forecast Survey

The first data sets that feed into the national balance sheet come from the Crop Forecast Survey (CFS). This survey uses a questionnaire that is developed and approved by the Ministry of Agriculture and the Central Statistical Office. The questionnaire for small and medium scale holdings contains the following sections:

- i. Demographic characteristics of household members;
- ii. Farmland and use (including crops, seed variety, fertilizer, the area cultivated, etc.);
- iii. Cassava production forecast (cassava is harvested all year round);
- iv. Seed type, use, and source;

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- v. Fertilizer acquisition;
 - vi. Labor costs.
 - vii. Forecast crop sales and seed retention from own production;
 - viii. Crop stocks.

The questionnaire for large scale farmers contains the following sections

1. General farm particulars;
2. Land utilization;
3. Crop portfolio;
4. Carry-over stocks;
5. Number of cattle;
6. Crop portfolio for the previous season;
7. Farm employment.

Data are currently collected using PDA devices.

Methodology

The Central Statistics Office and the Ministry of Agriculture develop sampling methods and use the agricultural Standard Enumeration Area (SEA) as the unit of measurement. They use a sample of 680 SEAs. However, this sampling may experience some issues as the number of districts has increased from 72 districts five years ago to 102 districts currently. Government statisticians suggested that the number of SEAs should increase to 1,000. This means an increase in the budget. The SEAs-based methodology is very expensive and costs USD 1 million a year to carry out the survey. This funding has always been available since the 1980s, and this survey is prioritized by the government. The source of funding is the Government of Zambia.

The crop forecast survey covers the period from October 1 to September 30. CFS Report provides data aggregated at national, province, and district levels. These data are published on the website of the Central Statistics Office (CSO) at <http://www.zamstats.gov.zm/>

Below is the 2017/2018 crop forecast survey data aggregated at the national level.

National 2017/2018 Crop Forecast Survey, Area, Expected Production, Yield, Expected Sales, and Fertilizer used (National)

	Area planted (ha)	Area expected to be harvested (ha)	Expected production (MT)	Yield (MT)	Expected total sales (MT)	Quantity of basal fert used (MT)	Quantity of top fert used (MT)
Maize	1,392,546	1,086,006	2,394,907	1.72	1,106,029.3	104,734.8	109,940
Maize for seed	8,316	8,300	44,169	5.31	39,047.4	3,082.0	2,979
Maize for silage	2,274	2,181	3,589	1.58	-	372.8	349
Green Maize	241	232	477	1.98	428.1	57.7	43
Sorghum	32,308	20,159	13,130	0.41	2,187.4	33.4	28
Rice	34,217	30,297	43,063	1.26	22,006.8	150.1	85
Millet	49,105	41,463	32,278	0.66	9,447.0	69.5	54
Sunflower	97,851	91,219	47,594	0.49	6,179.2	390.9	236
Groundnuts	284,708	259,479	181,772	0.64	72,775.3	93.5	71
Soya beans	205,508	191,930	302,720	1.47	255,278.9	11,323.1	2,233
Seed cotton	118,763	106,881	88,219	0.74	1,056.5	286.3	130
Irish potato	1,867	1,809	13,546	7.26	19,525.9	582.4	497
Virginia Tobacco	6,273	6,193	13,382	2.13	6,853.8	2,009.4	699
Burley tobacco	7,787	7,720	11,512	1.48	22.0	2,220.0	1,997
Mixed beans	84,566	79,624	52,351	0.62	25,282.9	(59,461,265.1)	(59,461,405)
Bambara nuts	7,253	6,855	7,039	0.97	2,470.9		
Cowpeas	14,022	11,691	6,824	0.49	2,868.7	16.7	5
Velvet beans	124	124	81	0.65			
Sweet potatoes	60,325	58,059	183,280	2.98	97,237.7	102.9	67

	Area planted (ha)	Area expected to be harvested (ha)	Expected production (MT)	Yield (MT)	Expected total sales (MT)	Quantity of basal fert used (MT)	Quantity of top fert used (MT)
Cassava	493	292	12	1.54	600.7		
Cashew nut	2,974	2,157	90,905	53.79			
Paprika	51	51	6	0.24	0.4	9.3	-
Pineapples	1,398	1,310	6,714	2.08			
Wheat	21,709	21,675	114,463	4.73	92,576.4	7,114.7	7,041
Barley	936	936	5,102	6.87	3,492.8	301.2	310
Popcorn	11,190	10,041	9,459	1.04	6,572.2	367.3	396
Sugarcane (plantation)	379	379	3,597	21.43		7.4	7

Step 2: Stock Monitoring and Cross-border Trade

The second step in developing the National Food Balance Sheet consists of collecting data from grain traders and millers, and other processors such as breweries. The Zambia Revenue Authority also provides data on cross-border food trade flows. This step enables CSO and the ministry of agriculture to complete data on food availability and requirements.

Food Reserve Agency

The Zambia Food Reserve Agency (FRA) has been involved in the grain market for a long time, offering a price that was higher than the market price. The agency has also been buying more than 500,000 MT of grains on an annual basis. However, in recent years, FRA adapted its practices to ensure its operations do not distort the market. At the request of the private sector, FRA started to announce the exact quantities it would buy and proceeded to allow the private sector to be the first in the market and enter the market after private grain traders have finished buying their quantities. Finally, during the 2017/2018 season, FRA prices become lower than what the private sector was paying and bought significantly lower quantities as it has carry-over stocks that enable it to keep the mandated quantity of 500,000 MT.

Step 3: Analysis

Data analysis is conducted using SPSS. However, government statisticians wish they had access to Stata and R software as they are more robust than SPSS.

Step 4: Dissemination

The ministry of agriculture and the CSO publish the results of the CFS and Food Balance sheet in April/May of every year. A conference attended by more than 250 people is held at the Government complex to publish the result of the Crop Forecast Survey and the Food Balance Sheet. The government also makes policy pronouncements related to the export of agricultural commodities.


Legal Framework

The Census and Statistics Act, Chapter 127 of Zambia's laws (Agricultural Regulations), requires responses to surveys collecting data on agricultural production and food stocks. However, this law and its regulations have not always been enforced. The institutional set up for its operationalization is too loose and not autonomous, leading to high inaccuracy in the reported data, especially holders of food stocks.

Institutional set up

There are three key committees and 1 unit that are involved in the preparation of the Zambia National Food Balance Sheet:

1. Crop Estimate Committee: This committee is chaired by the Permanent Secretary of the Ministry of Agriculture and also includes officers from the CSO and research organizations such as IAPRI and FEWSNET (which has just closed down its operations in Zambia as the country has consistently been food secure).
2. Stock Monitoring Committee: This committee meets *every second Tuesday of the month* to receive and discuss figures on stock levels presented by stakeholders, especially grain traders, millers, and the Food Reserve Agency. Members of this committee include the Ministry of Agriculture, Food Reserve Agency, Vice President's Office (Department of Disaster



Management), Grain Traders' Association of Zambia, Millers Association of Zambia, Agricultural Consultative Forum, and research organization such as IAPRI. This committee is supposed to advise the Parliamentary Standing Committee on Agriculture that recommends policy dispensations to the government.

3. Food Security Committee: This a high-level committee that is chaired by the Vice President, and it is composed of food security line ministries, including the Ministry of Agriculture and the Ministry of Finance. This committee meets every quarter to review the status of food security in the country.
4. National Early Warning Unit: This is a unit in the ministry of agriculture that is staffed with statisticians who work with the Central Statistics Office to design and carry out crop estimate surveys and collect data from organizations that hold food stocks.

Looking Ahead

1. New National Food Balance Sheet

The current food balance sheet captured a limited list of crops, and it disregards other sources of food, such as livestock. When nutrition status is added to the food security equation, Zambia gets classified as the third hungriest country in Africa because of the limited food sources considered under the food balance sheet.

As a result, the Vice President urged the Early Warning Unit of the Ministry of Agriculture to expand the scope of the food balance sheet. The unit started to develop an expanded food balance sheet that includes more crops, fisheries, and livestock.

Republic of Zambia, Ministry of Agriculture Food Balance Sheet 2018/2019

Population: 17,134,444

Items	Supply					Domestic Utilization						Food supply per capita				
	Production	Opening stock as on May 1	Imports	Exports	Available Supply	Feed	Seed	Food Manufacture	FRA	Waste	Food	kg/day	Grams/day	Calories/day number	Protein day grams	Fat day Grams
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Cereals																
Maize	2,395.00	844.00	-	200.00	3,039.00	284.00	45.00	2,047.85	500.00	161.96	-	-	-	-	-	-
Maize flour	1,761.00	-	-	-	1,761.00	-	-	-	-	88.06	1,673.00	97.64	267.52	971.10	22.47	3.21
Wheat	114.00	68.00	233.00	-	415.00	-	-	405.64	-	9.11	-	-	-	-	-	-
Wheat flour	304.00	-	-	-	304.00	-	-	295.11	-	9.13	295.00	17.22	47.19	171.80	5.14	0.52
Rice, Milled	43.00	1.00	45.00	-	89.00	-	-	86.52	-	2.19	87.00	5.05	13.83	49.80	0.93	0.10
Sorghum	12.00	-	-	-	13.00	-	1.00	11.47	-	0.66	12.00	0.73	1.99	6.80	0.20	0.07
Millet	32.00	2.23	-	-	35.00	-	2.50	30.28	-	1.73	33.00	1.91	5.24	19.10	0.51	0.16
2. Root and Tubers																
Irish potatoes	14.00	-	-	-	14.00	-	-	12.87	-	0.68	12.87	0.75	2.06	7.18	0.03	-
Sweet potatoes	183.00	-	-	-	183.00	-	-	174.12	-	9.16	174.12	10.16	27.84	25.61	0.45	0.03
Cassava	4,102.00	-	-	-	4,102.00	-	-	3,897.22	-	205.12	-	-	-	-	-	-
Cassava flour	1,026.00	-	-	-	1,026.00	-	-	974.31	-	51.28	974.31	56.86	155.79	526.56	2.34	0.93
3. Sugars and Syrups																
Sugar, refined	490.00	-	-	200.00	290.00	-	-	290.00	-	-	290.00	16.92	46.37	179.45	-	-
4. Pulses																
Mixed beans	52.40	17.00	-	-	9.40	-	-	5.90	-	3.50	65.90	3.80	10.50	35.90	2.30	0.20
Cow peas	6.80	-	-	-	6.80	-	-	6.70	-	0.10	6.70	0.40	1.10	3.70	0.30	-

Items	Supply					Domestic Utilization						Food supply per capita				
	Production	Opening stock as on May 1	Imports	Exports	Available Supply	Feed	Seed	Food Manufacture	FRA	Waste	Food	kg/day	Grams/day	Calories/day number	Protein day grams	Fat day Grams
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5. Oil Crops																
Groundnuts	182.00	1.00	-	-	182.00	-	30.00	143.17	-	9.11	173.00	10.10	27.70	157.00	7.10	13.60
Soya beans	303.00	27.00	-	-	330.00	50.00	-	263.23	-	16.49	313.00	18.30	50.10	167.80	19.00	9.00
Sunflower	48.00	-	-	-	48.00	-	-	46.64	-	0.95	47.00	2.70	7.50	-	-	-
6. Meat																
Beef meat	200.00	-	-	-	200.00	-	-	196.00	-	4.00	196.00	11.40	31.30	47.00	5.80	2.50
Cattle offal	20.00	-	-	-	20.00	-	-	19.60	-	0.40	19.60	1.10	3.10	3.30	0.60	0.10
Pig meat	89.00	-	-	-	89.00	-	-	87.22	-	1.80	87.20	5.10	13.90	30.70	1.90	2.50
7. Milk																
Cow milk	280.00	-	-	-	280.00	-	-	271.60	-	8.40	271.60	15.90	43.40	26.50	14.30	14.30
8. Fish																
Freshwater fish	121.00	-	119.07	1.06	239.00	-	-	235.35	-	3.63	235.35	13.74	37.63	4.10	12.42	0.94
9. Poultry																
Eggs	54.00	-	-	-	54.00	-	-	52.35	-	1.62	52.35	3.06	8.37	11.64	2.76	0.21
Poultry	160.00	-	-	8.00	152.00	-	-	147.20	-	4.80	147.20	8.59	23.54	28.71	289.74	1.81
														2,473.68	388.29	50.21

2. ZAGIS

In Zambia, agricultural trade stakeholders are planning to start the **Zambian Grain Information System (ZAGIS)** that will be structured and provide the same services as the South African Grain Information Service (SAGIS) <http://www.sagis.org.za/>.

ZAGIS will be registered as a private sector company that is autonomous. It will conduct surveys on agricultural production, monitor food stocks held by grain traders, millers, Food Reserve Agency, and anyone who has food stocks. There will be a Statutory Instrument (SI) that recognizes ZAGIS as the sole manager of data related to the grain industry and compels any grain stockholder to provide data to ZAGIS. The owners of ZAGIS will include the Grain Traders' Association of Zambia (GTAZ), Millers' Association of Zambia (MAZ), Zambia National Farmers' Union (ZNFU), Food Reserve Agency (FRA), and the Government of Zambia represented by two ministries: (1) Ministry of Finance represented by the Central Statistics Office, and the Ministry of Agriculture represented by the Directorate of Policy and Planning.

The South African Trade and Investment Hub (SATIH) provides technical assistance to the establishment of ZAGIS.

Challenges

Limited Accuracy

Grain stakeholders made it clear that estimates of food availability derived from sparsely-populated input data often lead to large margins of error (estimated to be +/- 20,000 MT). This inaccuracy limits the usefulness of the FBS as an analytical tool and opens it up to political interference.

Given the effect that stock levels can have on food prices and their strategic use as a safeguard for domestic food security, accurate measurement of stock levels should be a policy priority for the compilation of the FBS. Currently, data on stock levels come from 15 corporate large grain traders who have the capacity to hold 941,000 MT. Millers source grain from large grain traders who also source from medium and small traders. Tracking stocks held by all the supply chain actors is done carefully to avoid double counting.

To ensure accuracy, the Ministry of Agriculture deploys officers from its agribusiness and planning and policy departments to physically verify stock levels in all the provinces. However, this inspection, coupled with the Statistics Act, has not led to the desired levels of accuracy due to the grain industry's political economy.

Political Economy

In addition to technical inaccuracies, millers and grain traders are prone to underreporting and creating artificial shortages to force the Food Reserve Agency (FRA) to off-load its stocks to millers at a lower price. FRA sells its stock to millers at a price below the price it paid to farmers to ensure that consumer prices are kept low. Furthermore, depending on the demand and supply situation, animal feed mills and poultry producers tend to report lower or higher stocks to persuade the government to restrict the export of soybeans or to allow them to import more.

Forecasts Versus Actuals

The Zambian National Food Balance Sheet uses forecast data collected after planting. However, a post-harvest survey can give a true picture of the total production levels. This survey is not conducted regularly. In fact, it has only been conducted once.

Statistical Analysis

Statisticians at the Ministry of Agriculture use old SPSS versions that may cause complications during the analysis. The adoption of Stata and R was highly recommended.



Skills Levels

The Ministry of Agriculture and other agencies involved in the development of the National Food Balance Sheet do not have enough personnel with skills in designing survey and development data collection instruments and analysis using advanced knowledge in statistics. Staff turnover is a common occurrence in the agencies charged with conducting the CFS and compiling the FBS. Once trained, many of their staff leave the government to work for development and technical partners. Partnership with local universities and research institutions can alleviate this issue and develop a pipeline of highly qualified individuals that can easily replace those who leave.