



UGANDA BUREAU OF STATISTICS



PRODUCER PRICE INDEX FOR AGRICULTURE (PPI – A)

METHODOLOGY

By

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Introduction

Agriculture continued to be the mainstay of Uganda's economy and accounted for 24.2 percent of the country's GDP in 2017/18.

The sector

- employs about 65 percent of the working population (UNHS 2016/17).
- More than half of rural employed population are engaged in Agriculture (56%) (Lbr force Survey 2017/18).

For a country that depends on agriculture for food, employment, foreign exchange earnings etc., it's paramount to compile a PPI-A and producer prices if we are to fully measure the sector's performance



Introdn Cont'd

Producer Price Indices (PPIs) are key economic indicators;

- critical inputs in policy & decision making processes.
- indicates the change in the prices of agriculture commodities produced within the country.

PPI-A only reflects average movement in prices

- measures average changes in the selling prices received by farmers (at the first point of sale /commercialization) for their production.

Therefore, it's an indicator for change in prices received by producers of agricultural products over time.



Function/Uses of Indices

- ✓ **Short-term indicator of inflationary trends;** A monthly or quarterly PPI with detailed product and industry data allows short-term price inflation to be monitored for agric products sold,
- ✓ **National accounts deflators;** The PPI-A is vital as a deflator of output or sales data for the compilation of production volumes in NA.
- ✓ **Indexation in legal contracts:** A procedure whereby long-term contracts for the provision of goods & services include an adjustment to the value of monetary amounts for the goods or services based on the increase or decrease in the level of a price index.
- ✓ Required by international organizations **for economic monitoring and comparison;**
- ✓ Used to businesses and researchers **looking at specific products and markets.**
- ✓ **For policy and planning.**

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Scope and Coverage of PPI-A



The PPI-A is an out put index, geographically covering the entire country

The PPI-A includes the three divisions of the sector of Agriculture, forestry and fishing;

- i. **Crop and animal production**
- ii. **Forestry & logging**
- iii. **Fisheries & aquaculture**

A total of 95 commodities are included in PPI-A



Scope and Coverage Cont'd



- **Type of price:** Producer prices (the price received by the farmers at the first point of sale /commercialization).
- **Activity versus products:** The index is for the agriculture, forestry and fisheries sector
- **Domestic versus import:** Focuses on agric products produced within the country and priced within the domestic markets
- **Classification:** The International Standard Industrial Classification (ISIC rev4)



Survey design and sampling



- The country has been stratified into five regions; Central, Western, West Nile, Eastern and Northern regions
- PPI-A markets were selected using purposive sampling approach with advice from experts
- In an initial survey conducted in 2015, **total of Twenty Eight (28)** producer markets were subjectively selected across the five regions of the country.
- In every market, **a price collection region zone** was selected for each commodity

Markets where prices are collected

Market Code	DISTRICT	Market Name
01	MASAKA	KABONERA
02	RAKAI	NAMBABI
03	LYANTONDE	KALIIRO
04	LWENGO	KATOVU
05	LWENGO	KYAWAGONYA
06	LYANTONDE	KYEMAMBA
07	NAKASEKE	NGOMA CENTRAL MARKET
08	SOROTI	ARAPAI
09	BUKEDEA	BUKEDEA CATTLE MARKET
10	PALISSA	KAMUGE
11	TORORO	KATAJULA
12	IGANGA	KAWETE
13	KABERAMAIDO	OCHERO LIVESTOCK MARKET
14	KUMI	ODELO LIVESTOCK MARKET
15	LIRA	AMACH MARKET
16	ALEBTONG	AMUGU MARKET
17	APAC	AYAGO MARKET
18	DOKOLO	CWAGERE MARKET
19	AGAGO	PATONGO MAIN MARKET
20	GULU	OPIT
21	ZOMBO	PAIDHA TC MARKET
22	NEBBI	POKWERO
23	RUKUNGIRI	BIKURUNGU
24	ISINGIRO	KABEREBERE
25	SHEEMA	KAGANGO
26	KABALE	KARUKARA
27	KIRUHURA	KAZO
28	NTUNGAMO	RUBAARE

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Initial Survey



The initial survey rationale included:

- To generate a list of all producer markets within the country
- To ascertain the vibrancy and tender value of the market
- To obtain knowledge of the product / item, i.e.;
 - study product or item before going to markets
 - be aware of different variations of the product and their pricing points
- To pretest the questionnaire
- Provide full description of:
 - physical characteristics of a commodity
 - price determining characteristics such as quantity discounts, method or timing of payment, type of seller, etc.
- Collect and record first price



Price Data Collection



Prices are collected:

- Using paper qnnaires by well trained market monitors
- Once a month during the second or the fourth week,
- At the first point of commercialization which represents the closest possible price to a farm gate price,
- From producers selling within the market,
- From 28 selected producer markets within the country,
- Farm gate prices for non-traded market commodities such as Cotton, Tobacco, Oil palm etc. are collected from establishments,

Units of Measure

For each market, common units of measure for a particular product are followed. Due to lack of infrastructure, products are not weighed

For livestock, an estimated live weight price is collected but later transformed into a per kilogram price.



Data Management



- Supervision is done on a quarterly basis by headquarter staff
 - Erroneous prices are identified and verified before the questionnaires are retrieved from the field
- Data entry is done using CsPRO and then exported to STATA for data editing and cleaning
- The cleaned dataset is then exported to MS Excel for further processing
 - Use Pivot table to generate an independent sheet for each commodity
 - Calculate the national geometric price average for each commodity in each period



Data Editing at HQs





Treatment of Temporarily Missing prices

All missing prices are imputed to ensure that we have a complete set of price and be able to compare like-with-like

We calculate the ratio of the geometric mean of the current to that of the previous period using matched observations in both periods

The missing price in the current period is then imputed as a product of the previous observed price and the price relative

		per kilogram prices of beans			
product	market	Dec-16	Jan-17	Feb-17	
	A	1,000	1,000	1,100	
	B	1,000	1,036	1,000	1,000
	C	900	1,000	1,100	1,200
	D	1,200	1,200	1,300	---
Geometric means:					
- current month (a)			1062.66	$a = (1000 * 1000 * 1200)^{(1/3)}$	
-previous month (b)			1025.99	$b = (1000 * 900 * 1200)^{(1/3)}$	
Monthly movement (c.)			1.04	$c = a/b$	

imputed price (IMP) = previous month's price x monthly movement(c.)

$$\text{IMP} = 1000 * 1.035744$$

$$= 1,036$$

- Imputed prices are flagged for easy identification
- All missing prices are imputed including those missing due to seasonal factors



Price estimation and Reference prices



Following the expansion of the scope of the PPI-A in January 2018;

- implied no collected prior prices for the new commodities brought on board,
- Price estimation for these commodities was done using the CPI trends

Reference prices

For each commodity, a reference price was computed as a geometric average price for all observed prices of that commodity for the period starting July 2016 to June 2017



Weights and their Sources



PPI-A derives its weights from the Supply and Use Table (SUT) of 2016/17 obtained from the National Accounts.

In the 2016/17 SUT;

- All the non-agricultural products removed,
- The value at basic prices of the individual activities was then summed to get the total value of production for the sector;

The value of other cash crops was allocated to Oil Palm, wheat and other cereals to cereals, other root crops to yams, legumes to all legumes and other fruits & Nuts to Fruits & Nuts & Citrus fruits

The value of Camels, Horses, Asses, Mules was added to the value of Cattle and Buffaloes, other poultry to turkey, eggs for other poultry added to Chicken Eggs,

The value of Fisheries was apportioned to get the value of aquaculture fishing

The value of the Agric support services was proportionately apportioned across the three (3) ISIC divisions of the sector and added to their total value of production



Weights and their Sources cont'd



The weights were fixed at a four digit level e.g. for cereals

- items below the four digit level were ranked according to their relative importance
- After ranking all the items, the ranks are inverted so that the most important commodity with the group gets the biggest rank
- For each commodity, the individual inverted rank is then divided by the sum of the ranks to generate the proportion for each commodity
- The value for each commodity is then calculated as a product of its proportion

Example.

Description	Rank(r))	Inverse(ir)	Proportion($p=ir/\sum(ir)$)	Value of production = $p_i \cdot V$
Growing of fruit bearing veg	1	3	0.50	213,522
Growing leafy or stem vege	2	2	0.33	142,348
Growing of root, bulb or tuberous vegetables	3	1	0.17	71,174
Vegetables and Melons		6	1	427,044 (V)



Weights and their Sources cont'd



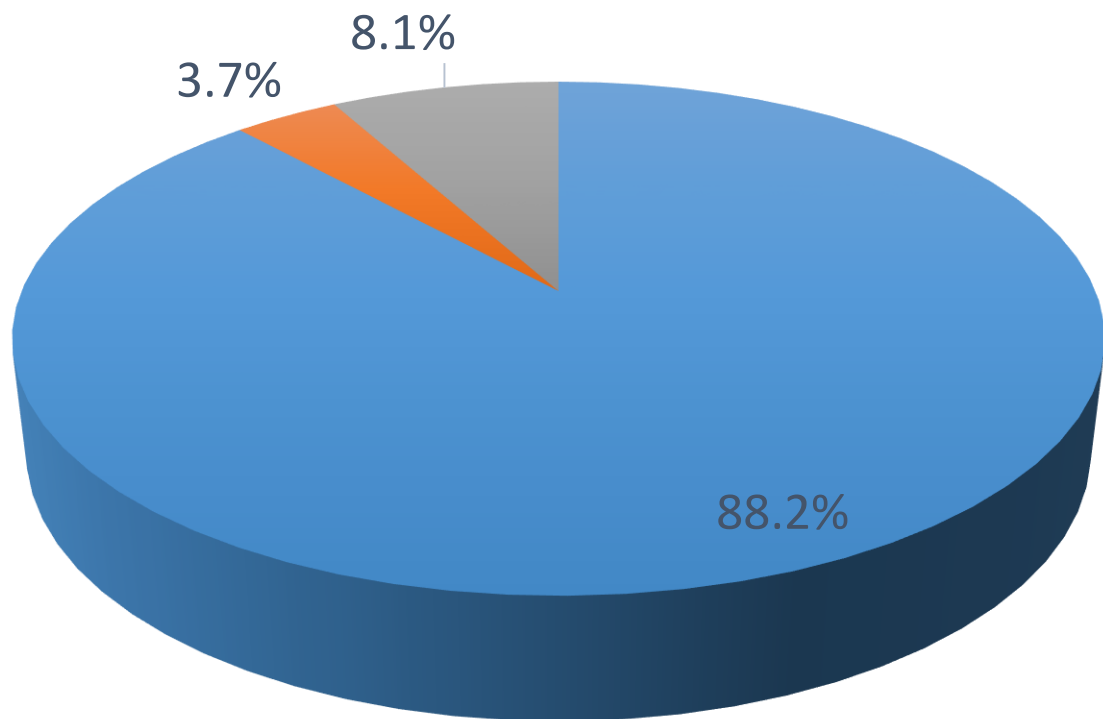
On certainty that each commodity now has an allocated value of production, we then proceed to compute the weight each commodity contributes to the entire sector.

- The sector weights are fixed to sum up to 1000.
- The individual level weights are calculated as a share of the individual values of production at each level of the ISIC to the total value of production.
- At this point we have an extrinsic weight for each of our commodity and we can therefore, ascertain the contribution of each level to the entire sector.

Updating the weights

Frequency of updates depends on the availability of updated SUT but desirable would be that weights are updated after every 5 years

Contribution of the divisions to the Section weights



■ Crop and Animal Production ■ Forestry & Logging ■ Fishing & Aquaculture

PPI-A weights for the different Classes

..	Particulars	Weights
SIC CODE	Industry Group (Local)	
0	All Items	1,000.0000
01	Crop and Animal production, hunting	882.0013
0111	Growing of cereals (Except rice), leguminous c	254.4393
0112	Growing rice	24.8681
0113	Growing vegetables and melon, roots and tub	197.9269
0114	Growing sugarcane	10.007354
0115	Growing tobacco	2.760118
0116	Growing of fibre crops	5.3206
0119	Growing of other non-perennial crop	4.2195
0122	Growing of tropical fruits and subtropical fruits	132.0837
0123	Growing of citrus fruits	14.6267
0127	Growing of beverage crops	80.9940
0128	Growing of spices, aromatic, drug and pharma	0.6419
0141	Raising cattle and buffaloes	66.3941
0144	Raising of sheep and goats	31.3853
0145	Raising of swine/pigs	27.6718
0146	Raising of poultry	27.0237
0149	Raising of other animals	1.6383
02	Forestry AND Logging	37.2748
0220	Logging	37.2748
03	Fishing and Aquaculture	80.7238
0312	Freshwater Fishing	79.1094
0322	Freshwater aquaculture	1.6145



Index compilation



The reference period for weights and prices is F/Y 2016/17

The index is then compiled using the Laspeyres' method for the fixed basket as below;

$$I_{FW} = \frac{\sum_{i=1}^n w_{i0} \frac{p_{it}}{p_{i0}}}{\sum_{i=1}^n w_{i0}} * 100$$

Where w_{i0} is the fixed weight of the i^{th} item at the reference period

Step 1 of the index compilation

HOME PAGE				Jul-17	Aug-17	Sep-17	Oct-17
ISIC CODE	Industry Group (Local)	SUT 16/17 WEIGHT	Reference Period	Index	Index	Index	Index
Computation Totals	Division	1,000.00	100.5546	104.4165	104.5840	105.5451	104.3411
Computation Totals	Group	1,000.00	100.5546	104.4165	104.5840	105.5451	104.3411
Computation Totals	Class	1,000.00	100.5546	104.4165	104.5840	105.5451	104.3411
Computation Totals	All Items	1,000.00	100.5546	104.4165	104.5840	105.5451	104.3411
	Ag. PPI	1000	100.55	104.416529	104.584023	105.5450819	104.3410912
	Crop and Animal prod	882.0013344	88.75	91.8840957	92.64428558	92.95118914	91.92307008
0111	Growing of cereals (E	254.44	25.44	25.75	24.74	24.57	23.61
01111	Growing of cereals	107.07	10.71	10.75	9.75	9.35	8.70
011111	Grain Maize	83.439570	8.343957	8.604	7.672	7.303	6.809
	Prices	3,544	3,544	3,655	3,259	3,102	2,892
011112	Sorghum	11.22	1.12155	0.93	0.93	0.90	0.78
			100.00000	82.89942	83.35403	79.94695	69.60882
0111121	White Sorghum	7.477002	0.747700	0.626624	0.616684	0.574613	0.506820
			100.000000	83.806873	82.477420	76.850665	67.783862
	Prices	942	942	789	777	724	639
0111122	Red Sorghum	3.738501	0.373850	0.30	0.32	0.32	0.27
			100.000000	81.084524	85.107262	86.139529	73.258741
	Prices	1,671	1,487	1,206	1,265	1,281	1,089
11113	Millets	12.41355139	1.241355139	1.216480422	1.14818556	1.152869903	1.111327774
			100	97.99616429	92.49452663	92.87188381	89.5253694
	Prices	2,610	2,610	2,558	2,414	2,424	2,337
01112	Growing of Legumious	80.33	8.0333	8.14	8.08	7.89	7.37
011121	Beans	75.15	7.51	7.20	7.17	6.94	6.58
0111211	Nambaale	21.471223	2.147122	2.08	2.11	2.13	2.03
	Prices	8,291.204792	8,291.204792	8,030	8,159	8,241	7,828
0111212	Yellow	17.892686	1.789269	1.79	1.71	1.74	1.71
	Prices	8,501.675737	8,501.675737	8489.948524	8125.193949	8269.573361	8131.79105
0111213	Mafuta	14.314149	1.431415	1.37	1.42	1.29	1.16
	Prices	10,036.017540	10,036.017540	9609.964256	9975.454451	9079.386586	8166.840694
0111214	Kanyebwa	10.735612	1.073561	0.89	0.88	0.86	0.80
	Prices	7,512.273424	7,512.273424	6230.507469	6151.983109	5990.952944	5596.79878

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Step 2 of the index compilation

			Reference p	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17
ISIC CODE	Industry Group (Local)	SUT 16/17 WEIGHT		Index	Index	Index	Index	Index
A	All Items	1,000.0000	100.00	103.84	104.01	104.96	103.77	104.28
01	Crop and Animal production, hu	882.0013	100.00	103.53	104.38	104.73	103.57	103.22
0111	Growing of cereals (Except rice),	254.4393	100.00	101.22	97.22	96.58	92.78	89.43
01111	Growing of cereals	107.0686	100.00	100.40	91.11	87.35	81.27	80.56
011111	Grain Maize	83.4396	100.00	103.12	91.95	87.52	81.61	79.23
011112	Sorghum	11.2155	100.00	82.90	83.35	79.95	69.61	72.55
0111121	White Sorghum	7.4770	100.00	83.81	82.48	76.85	67.78	71.54
0111122	Red Sorghum	3.7385	100.00	81.08	85.11	86.14	73.26	74.56
11113	Millet	12.4136	100.00	98.00	92.49	92.87	89.53	96.75
01112	Growing of Legumious crop	80.3328	100.00	101.36	100.59	98.25	91.68	87.12
011121	Beans	75.1493	100.00	95.76	95.36	92.30	87.60	82.20
0111211	Nambaale	21.4712	100.00	96.86	98.41	99.40	94.41	83.66
0111212	Yellow	17.8927	100.00	99.86	95.57	97.27	95.65	92.19
0111213	Mafuta	14.3141	100.00	95.75	99.40	90.47	81.38	80.13
0111214	Kanyebwa	10.7356	100.00	82.94	81.89	79.75	74.50	64.77
0111215	White	7.1571	100.00	101.84	96.06	84.49	81.41	84.63
0111216	Black	3.5785	100.00	94.98	98.96	85.38	83.04	79.23
011125	Pigeon peas	5.1836	100.00	182.62	176.30	184.63	150.87	158.52
01113	Growing of oil seeds	67.0378	100.00	102.34	102.95	109.31	112.48	106.36
011131	Groundnuts	22.1879	100.00	104.35	104.67	109.68	111.45	98.26
011132	Simsim	11.3606	100.00	105.64	111.54	106.59	108.15	105.25
011133	Soya beans	1.9538	100.00	101.10	108.10	110.55	103.10	90.98
011134	Sun flower	1.2037	100.00	100.14	103.29	103.87	104.51	100.73
011135	Palm	30.3318	100.00	99.80	98.12	110.20	115.78	113.92
0112	Growing rice	24.8681	100.00	99.82	98.75	94.89	90.19	85.47
01121	Rice	24.8681	100.00	99.82	98.75	94.89	90.19	85.47
011211	Kaiso	16.5787	100.00	100.41	102.75	104.39	97.42	90.71
011212	Super	8.2894	100.00	98.65	90.73	75.89	75.73	75.00
0113	Growing vegetables and me	197.9269	100.00	98.05	100.02	102.92	100.44	104.68



Compilation of higher level indices



The second stage of index calculation is aggregation of elementary price indices to higher level indices

The relative importance (Long term relatives) at each elementary level are summed up and multiplied by 100 as below;

$$I^{0:t} = \sum W_i^b * I_i^{0:t}$$

where $I^{0:t}$ denotes the overall PPI-A, or any higher level index, from period 0 to t; W_i^b is the weight attached to each of the elementary price indices; and $I_i^{0:t}$ is the corresponding elementary price index.

The elementary indices are identified by the subscript i, whereas the higher-level index carries no subscript.

As already noted, a higher-level index is any index, including the overall PPI-A, above the elementary aggregate level.

The weights are derived from revenue in period b, which in practice has to precede period 0, the price reference period.



Revision Policy



The index for a given month will be subject to revision to accommodate the late reporting of prices.

As late prices are received, they will replace the imputed prices and the index is recompiled.

Indexes will be preliminary for one quarter. The index will be noted as final in the next quarter of release.



Challenges



- The Nature of Uganda's agriculture sector (seasonality)
- Non-Standard Units of Measure
- To mention but a few.



THANK YOU FOR LISTENING