



The Nigerian Food Basket: Production and Single Factor Productivity Measures of Major Staple Food Crops at a Glance

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Abstract

This paper looked at the Nigerian food basket highlighting the land areas devoted to various major food crops, their total national output and productivity over the years 2008 through 2013. The study used domestic food crop (agricultural) production data from the National Agricultural Extension and Research Liaison Services (NAERLS) for Agricultural Performances in Nigeria, undertaken annually by multi-disciplinary teams of scientists across the country using Participatory Rural Appraisal (PRA) techniques. The results revealed that a number of these crops have witness decline in area cultivated and in total national output. Furthermore, most of the food crop had abysmal productivity (yield) gap between the national averages and global averages. There is an urgent need to transform agriculture in Nigeria to feed it populace and also take advantage of the trends in global, particularly, African food demand. Moreover, increased cropping intensity and expansion of irrigated production area in regions that can support these options in a sustainable manner cannot be overemphasized; failure of which will result in increasing dependence on food imports. The importance of adequate investments by the public and private sectors, accompanied by facilitating government policies to meet this challenge and to ensure intensification without negative environmental consequences becomes imperative.

Keywords: Food basket, Staple food crops, Food production, Productivity and Nigeria.

Introduction

Although global food demand is expected to increase 60% by 2050 compared with 2005/2007, the rise is expected to be much greater in sub-Saharan Africa, SSA (Van Ittersum *et al*, 2016). Van Ittersum *et al*, (2016), further noted that, indeed, SSA is the region at greatest food security risk because by 2050 its population will increase 2.5-fold and demand for cereals approximately triple, whereas current levels of cereal consumption for instance, already depends on substantial imports. Nigeria is the most populous country in SSA and the issue, to begin with, is whether Nigeria can meet this vast increase in food demand without greater reliance on food imports or major expansion of agricultural area?

In spite of the oil, agriculture remains the base of the Nigerian economy, providing the main source of livelihood for most Nigerians. Particularly, agriculture still remains the largest sector of the Nigerian economy and employs two-thirds of the entire labour force. Meanwhile, the production hurdles have significantly stifled the performance of the sector. For instance, the Food and Agriculture Organization of the United Nations have asserted that, over the past 20 years, value-added per capita in agriculture in the country has risen by less than 1 percent annually (FAO, 2017). Food production in the country at a time was sufficient and yielded export rate of about 58% in the 1960 but has drastically reduced to 3% by the close of the century (Adewumi 2002).

Nigeria is naturally endowed with ample land and water resources, which have given the nation's agricultural sector high capacities for increased growth, but these potentials are not being fully exploited. Despite the obvious abundant human and natural resources, the country is still unable to feed its' populace. Food (crop) production increases have pathetically not kept pace with population growth, causing rising food imports and declining levels of national food self-sufficiency and so, Nigeria, who was once a large net exporter of food, is now a net food importer

(FGN, 2009; Nwajiuba, 2012). It is to be noted however that the main factors undermining production has to do with reliance on rain-fed agriculture, smallholder land holding, and low productivity due to poor planting material, low fertilizer application, and a weak agricultural extension system amongst others. Conversely, productivity has been a key issue for agricultural development strategies because of its impact on economic and social development. It is generally believed that the surest means through which mankind can raise itself out of poverty to a condition of relative material affluence is by increasing productivity. Researchers have indicated that the global increase in food demand by 2050 can be met through closing the gap between current farm yield and yield potential on existing cropland (Koning, 2008; Mueller, 2012; Pradhan 2015).

Food is a basic necessity of life. Its importance is seen in the fact that it is a basic means of sustenance and adequate food intake, in terms of quantity and quality, is a key for healthy and productive life. The importance of food is also shown in the fact that it accounts for a substantial part of a typical Nigerian household budget (Omonona & Agori, 2007). Food insecurity remains a fundamental challenge in Nigeria, as recent estimates put the number of hungry people in country as over 53 million, which is about 30% of the country's total population of roughly 150 million (Ajayeoba, 2010).

Consequently, in the light of the necessity of the country to rise above food production insufficiency occasioned by low productivity, the need to further understanding in these areas becomes significantly imperative, to allow for proper planning of agricultural production and growth in the country. In this paper, the author examines the agricultural production of some major food crops at the national level, the cultivated area and partial productivity measures per food crop and further provides feedbacks for improved research and policy framework for agricultural production in the country. These measures become imperative as the sustainable growth rates of the Nigeria's economy cannot be achieved in the absence of planned and sustained increased agricultural productivity in the country. The potential gains from the growth and development of agricultural sector cannot be over emphasized.

Methodology

Source of Data and Analysis

The study uses domestic food crop (agricultural) production data from the National Agricultural Extension and Research Liaison Services (NAERLS) for Agricultural Performances in Nigeria, an annual assessment of field situation of wet season agriculture in the country. The yearly survey is undertaken by eighteen multi-disciplinary teams of three scientists each carrying out the exercise across the states and FCT using Participatory Rural Appraisal (PRA) techniques. Data were obtained from the Annual Agricultural Performance Survey Report of Nigeria, 2009 through 2013, retrieved from the NAERLS website.

Measures of productivity can be divided into partial or total measures depending on the number of inputs under consideration. Total output as a ratio of some measure of labour quantity, usually man-days in developing countries, is called labour productivity (LP) and provides some notion of output per worker; while output per area of land planted is land productivity (Zepeda, 2001; Wiebe *et al.*, 2003). The two previously mentioned measures are examples of single factor productivity (SFP), defined as the ratio of a measure of output quantity to the quantity of a single input used (Diewert and Nakamura, 2005). For this study, the latter measure of productivity is used. This measure p_{sfp} is given as;

$$p_{sfp} = \frac{\text{Total national food crop output (Mt)}}{\text{Total national land area cultivated (Ha)}}$$

Where p_{sfp} : is the single factor productivity of each food crop.

Results and Discussion

The land area devoted to the cultivation of most crops from the year 2008 to 2013 generally increased over the period, although most of the increases were marginal between the range 0.2 to about 7.0% (most), while some others had significant decline as presented in Table 1. Millet for instance had 30% and 52.6% decline in 2010 and 2012 over the preceding years respectively. Millet, which is a very important cereal crop among the peasants in the northern part of the country especially as one moves further into Sudan and Sahel Savannahs is shown by this data to be endangered, as less and less land area are devoted to its cultivation. This might not be unconnected with the surge of violent insurgency that was the experience of the north-eastern part of the country recently, displacing farmers from their homeland. Maize is the most widely cultivated grain in the country, having some industrial uses and one of the major staple food crops. Area of land devoted to its cultivation had increased between years 2008 till 2012 with the most percentage increase year being 2012, at 11.6% (See Table 1). It however experienced a decline in 2013 (-1.3%). It is however remarkable that area of land devoted to rice cultivation, consequent upon repeated campaign for local production, experienced increasing trend (See Table 1). Yam cultivated area that lost 17.3% devoted land in 2010 gained a 67.5% increase in 2012. In the same year (2012), Cassava total national cultivated land area also increase by 69.6% despite the flood disaster along the river Benue/Confluence area experienced that year.

Table 1: National total of land area cultivated for various staple food crops (000 Ha)

| | 2008 | 2009 [$\Delta\%$] | 2010 [$\Delta\%$] | 2011 [$\Delta\%$] | 2012 [$\Delta\%$] | 2013 [$\Delta\%$] |
|-------------------|---------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Maize | 4668.78 | 4862.62[4.2] | 5060.04[4.1] | 5153.37[1.8] | 5751.12[11.6] | 5676.62[-1.3] |
| Sorghum | 4734.18 | 4793.84[1.3] | 5040.09[5.1] | 4891.15[-3.0] | 5385.22[10.1] | 5438.80[1.0] |
| Rice | 2009.04 | 2140.82[6.6] | 2554.18[19.3] | 2579.56[1.0] | 2871.30[11.3] | 2981.94[3.9] |
| Millet | 3640.02 | 4110.48[12.2] | 2877.66[-30.0] | 2889.02[0.4] | 1369.80[-52.6] | 1404.96[2.6] |
| Cowpea | 2510.48 | 2560.03[2.0] | 3227.11[26.1] | 3189.95[-1.2] | 3480.57[9.1] | 3586.33[3.0] |
| Ground nut | 2130.94 | 2186.41[2.6] | 2340.82[7.1] | 2342.80[0.1] | 2661.65[13.6] | 2720.97[2.2] |
| Yam | 3370.54 | 3478.37[3.2] | 2877.70[-17.3] | 2889.02[0.4] | 4837.68[67.5] | 5083.62[5.1] |
| Cassava | 3484.08 | 3629.04[4.2] | 3898.87[7.4] | 3917.76[0.5] | 6644.18[69.6] | 6718.49[1.1] |
| Cocoyam | 386.42 | 406.15[5.1] | 452.12[11.3] | 455.30[0.7] | 622.70[36.8] | 631.92[1.5] |
| Soybean | 362.56 | 368.34[1.6] | 609.56[65.5] | 608.67[-0.2] | 668.26[9.8] | 678.01[1.5] |
| Tomatoes | n.a. | n.a. | 834.47 | 835.80[0.2] | 468.60[-43.9] | 511.75[9.2] |
| Onion | n.a. | n.a. | 409.16 | 373.47[-8.7] | 386.22[3.4] | 439.99[13.9] |

Figures in parenthesis are percentage change from previous year

Total National Production Output for Major Food Crops between the Years 2008-2013

As presented in Table 2, the total national production estimates for various staple food crops are indicated. Rice for instance, which is the most important staple food in Nigeria, the total output as at 2013 was about 5.8 million Mt (paddy), which when milled yield about 3.5 million Mt at 60% milling rate. This figure compared with the annual consumption rate of over 6 million Mt leaves about 3 million Mt supply-demand gap which can only be filled with importation with its attendant forex deficit bill. Meanwhile, the president of International Fund for Agricultural Development, IFAD, in Nigeria, Dr. Kanayo Nwaze, disclosed that the country has the potential of turning out 10 million Mt of rice annually (Vanguard, 2016). It is however notable that the 5.8 million Mt of 2013 turnout (output) was as a result of the Agricultural Transformation Agenda, ATA, campaign, as production gained 19.2% increase in 2012 and 6.9% in 2013. As it is at present, the Global Agricultural Information Network, GAIN report have noted that, with limited government support and low-level private sector investments in paddy production, domestic

supplies still fall significantly short of local demand. The reason being that, small scale farmers are uncertain about the government's policy direction. For example, stalled activities under the Government of Nigeria's Growth Enhancement Scheme continue to limit new investments in land preparation and expansion, especially for reclaimed area from insurgencies (GAIN, 2016). On the other hand, sorghum, which undoubtedly increasingly becomes the most important staple as one moves from the guinea savannah upwards, experienced declined total output in 2011 and 2012. The GAIN 2016 report has noted that only about 50,000Mt of sorghum is exported annually despite the huge potential for its production in the country. Furthermore, only about 200,000Mt of Maize is exported to neighbouring countries like Cameroon, Niger, Benin, and Chad from the excess of about 10 million Mt annual total output of which about 7.3 million Mt is consumed domestically (GAIN, 2016). Nigeria seems not to be seizing the opportunities of the new global trend in the demand for food particularly in Africa. National output for Cassava and Yam, which the country is leading in total global production output are seldom exported, barely adequate for national consumption.

Table 2: National total of production estimate for various staple food crops (000 MT)

| | 2008 | 2009 [Δ%] | 2010 [Δ%] | 2011 [Δ%] | 2012 [Δ%] | 2013 [Δ%] |
|------------------|----------|---------------|----------------|---------------|----------------|----------------|
| Maize | 7375.45 | 7771.77[5.4] | 9006.99[15.9] | 9180.24[1.9] | 8695.31[-5.3] | 10279.61[18.2] |
| Sorghum | 5568.98 | 5638.19[1.2] | 7600.46[34.8] | 6897.08[-9.3] | 6419.43[-6.9] | 6725.08[4.8] |
| Rice | 3543.51 | 3759.95[6.1] | 4537.80[20.7] | 4567.29[0.6] | 5444.41[19.2] | 5817.92[6.9] |
| Millet | 4004.13 | 3922.47[-2.0] | 1381.00[-64.8] | 1271.11[-8.0] | 1280.57[0.7] | 1314.00[2.6] |
| Cowpea | 1436.42 | 1480.96[3.1] | 1852.04[25.1] | 1860.78[0.5] | 3313.70[78.1] | 3334.60[0.6] |
| Groundnut | 2622.15 | 2690.52[2.6] | 2952.79[9.7] | 2962.77[0.3] | 3313.74[11.8] | 3334.62[0.6] |
| Yam | 32556.64 | 33577.88[3.1] | 37039.48[10.3] | 37115.50[0.2] | 38739.68[4.4] | 42849.34[10.6] |
| Cassava | 44827.08 | 47274.32[5.5] | 52316.50[10.7] | 52403.48[0.2] | 50955.01[-2.8] | 54023.15[6.0] |
| Cocoyam | 3039.70 | 3203.50[5.4] | 3263.72[1.9] | 3265.71[0.1] | 3261.15[-0.1] | 3326.26[2.0] |
| Soybean | 507.45 | 519.54[2.4] | 599.56[15.4] | 564.76[-5.8] | 649.88[15.1] | 669.03[2.9] |
| Tomatoes | n.a. | n.a. | 297.87 | 300.93[1.0] | 2108.36[600.6] | 2143.12[1.6] |
| Onion | n.a. | n.a. | 308.64 | 309.53[0.3] | 964.20[211.5] | 978.81[1.5] |

Figures in parenthesis are percentage change from previous year

Single Factor Productivity Estimate for Major Food Crops in Nigeria

The African Development Bank explicitly highlights self-sufficiency in food production as a principal goal of its Action Plan for an African agricultural transformation (ADB, 2015). Hence, a key question is whether Nigeria, the most populous country in Africa, can be food self-sufficient and whether this can be achieved on existing agricultural land through yield increase or will rely on continued crop area expansion as has occurred in the past four decades (Brink and Eva 2009). Currently, the average productivity measures of the major staple crops presented in Table 3 fall grossly below the world averages, a pertinent feature calling for concern. Soybean for instance, the average world productivity is 2.8Mt/Ha and rice is 7.9Mt/Ha. The range of productivity per hectare for both soybean and rice are 0.93-1.41Mt/Ha and 1.76-1.95Mt/Ha respectively. That of soybean has even been on the decline since 2008 as shown from Table 3 and Figure 1, despite the high food value and rich nutritive content of soybean for both human consumption and animal feeds. It is obvious here that soybean as a food crop has received little or no attention from researchers, policy makers and even farmers who are the end users. Equally, millet productivity, instead of an increasing trend, has been undergoing a decreasing trend (See Figure 1); a situation that predisposes Sudan and Sahelian poor populace to adverse food insecurity, since this grain crop is the most important food crop in these regions. The figures in Table 2 and 3 for millet not only indicate decreased production but declining productivity. Maize global average productivity of

9.4Mt/Ha compared to Nigeria’s best 1.81Mt/Ha (2013) year is still abysmally 80.75% short of the world average, denoting a world of room for improvement. The almost 81% gap in maize productivity and others calls for drastic measures to the rescue. Such yield gaps closure requires a large, abrupt acceleration in rates of yield increase. If this acceleration is not achieved, massive cropland expansions with attendant biodiversity loss and greenhouse gas emissions or vast import dependency are to be expected in the years to come. Even cassava for which the country is known as the largest producer in the world, the productivity trend is on the decline (See Figure 2) and as at 2013, the Nigerian cassava yield of 8.04Mt per hectare is still lower than the world average yield of 10.76 Mt/Ha.

Figures 1 and 2 depict the trends of single factor productivity measures of the major food crops in Nigeria.

Table 3: National total productivity estimate for various staple food crops (Mt/Ha)

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|------------|-------|-------|-------|-------|------|------|
| Maize | 1.58 | 1.60 | 1.78 | 1.78 | 1.51 | 1.81 |
| Sorghum | 1.18 | 1.18 | 1.51 | 1.41 | 1.19 | 1.24 |
| Rice | 1.76 | 1.76 | 1.78 | 1.77 | 1.90 | 1.95 |
| Millet | 1.10 | 0.95 | 0.48 | 0.44 | 0.93 | 0.94 |
| Cowpea | 0.57 | 0.58 | 0.57 | 0.58 | 0.95 | 0.93 |
| Ground nut | 1.23 | 1.23 | 1.26 | 1.26 | 1.24 | 1.23 |
| Yam | 9.66 | 9.65 | 12.87 | 12.85 | 8.01 | 8.43 |
| Cassava | 12.87 | 13.03 | 13.42 | 13.38 | 7.67 | 8.04 |
| Cocoyam | 7.87 | 7.89 | 7.22 | 7.17 | 5.24 | 5.26 |
| Soybean | 1.40 | 1.41 | 0.98 | 0.93 | 0.97 | 0.99 |
| Tomatoes | n.a. | n.a. | 0.36 | 0.36 | 4.50 | 4.19 |
| Onion | n.a. | n.a. | 0.75 | 0.83 | 2.50 | 2.22 |

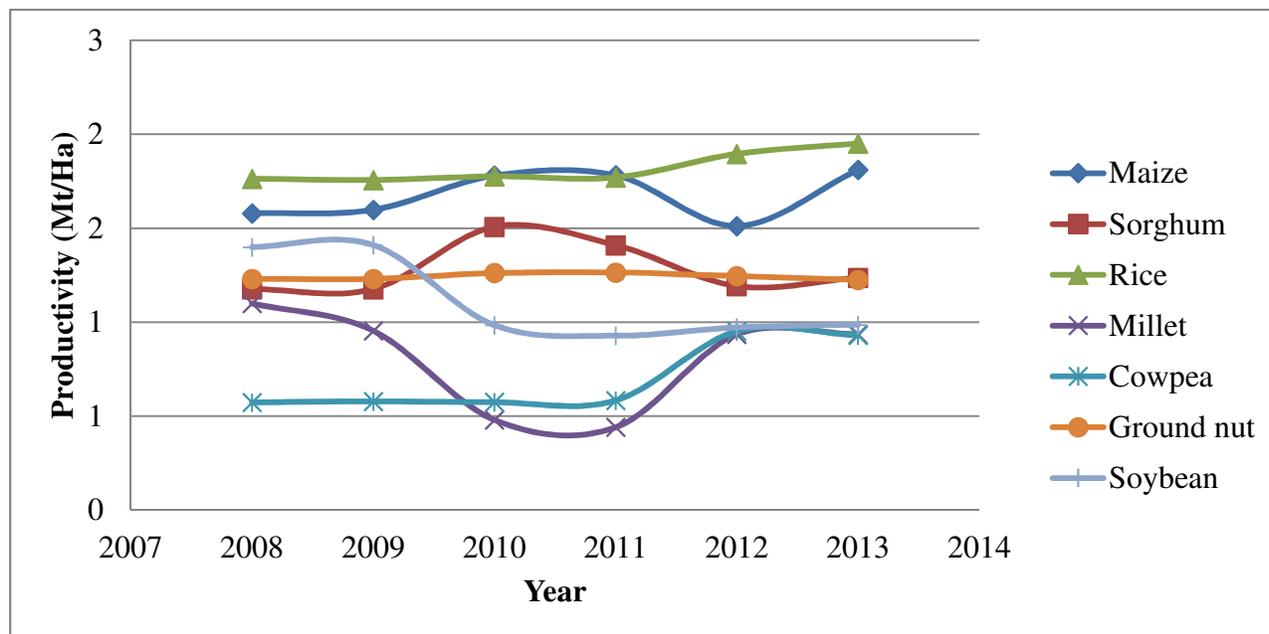


Fig 1. A graph of productivity measures of grain food crops

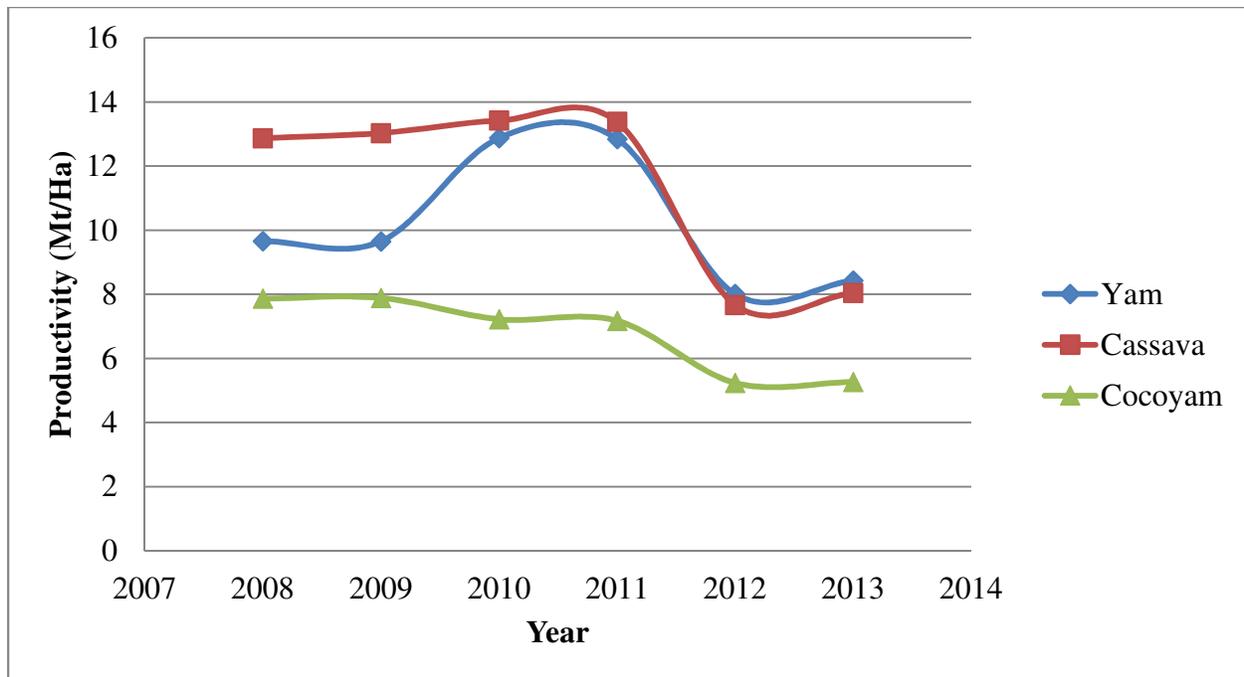


Fig 2. A graph of productivity measures of tuber food c

Conclusion and Recommendation

This paper looks at the land areas devoted to various major food crops, their national output and productivity over the year 2008 through 2013. A number of these crops have witness decline in areas cultivated and also total national output, an indication not good for national food sovereignty. Furthermore, most of the food crop had abysmal productivity (yield) gap between the national averages and global averages. Thus, there is therefore an urgent need to transform agriculture in Nigeria to feed it populace and also take advantage of the trends in global, particularly, African food demand. The path to food self-sufficiency will therefore, require rigorous research and investment effort to close the productivity (yield) gap. In addition to yield gap closure, increased cropping intensity and expansion of irrigated production area in regions that can support these options in a sustainable manner becomes imperative. Failure to achieve these intensification options will result in increasing dependence on food imports and vast expansion of rain-fed cropland area, to cater for the population rise and subsequent demand for food in the country. Furthermore, the importance of adequate investments by the public and private sectors, accompanied by facilitating government policies to meet this challenge and to ensure intensification without negative environmental consequences becomes imperative.

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