
Overview

The purpose of this literature review is to provide an overview of past, current, and projected future trends in agricultural productivity growth. It is difficult to measure productivity and while there are many robust empirical studies contributing to the productivity literature, there is no methodological consensus and each methodology used carries its own set of biases. This brief is intended to provide an overview of the literature and a rough range of total and partial factor productivity growth estimates at the global, regional, and national levels where available.

Productivity refers to output per unit of input and is commonly measured as a change in total or partial factor productivity. Total factor productivity (TFP) is a ratio of inputs to outputs, computed using shadow prices and indices weighted by value or production shares. Changes in TFP are calculated as the change in output minus the change in inputs, in order to reflect productivity changes, rather than changes in inputs alone. It can be decomposed into technical change and efficiency change.¹ Prices provide a common metric to allow aggregation of different crops and agricultural commodities. Partial factor productivity (PFP) measures aggregate output per unit of land or labor input. Common proxy indicators for partial factor productivity are single crop outputs per unit of land (yield), meat produced per animal (livestock yield) or aggregate output per unit of a single input such as fertilizer or seed. TFP is considered to be superior to PFP as a measure of a sector's efficiency.² Partial measures of productivity can be difficult to interpret, since multiple methodologies are used in calculation and changes could have a variety of causal factors. For example, increasing land or labor productivity may arise due to tractor or fertilizer use, or a change in output mix (movement to a higher value crop, for instance).³ Furthermore, the measures do not take into account changes in other inputs that could contribute to changes in output, possibly overstating the influence of the examined input.⁴ However, partial measures are often more accessible and easier to evaluate with existing data sources. For more discussion of productivity, see EPAR Brief No. 120 *Agricultural Productivity and Poverty Reduction: Linkages and Pathways*.

This review looks at recent assessments of TFP and PFP growth measures of land and labor productivity and crop and livestock yields, which offer multiple indicators with mixed evidence for global trends in agricultural productivity growth.⁵ The estimates vary mostly due to different time periods, countries included, and the estimation method. The studies generally use the same output data source (the FAO country output index), however, key differences in the data include: whether livestock is included; the reference for input accounting (base period, currency conversion, source of shadow prices for inputs); whether the quality of inputs is adjusted for; and whether agricultural research and development is included as an input. In general, however, different methodological approaches, rather than different data sources, explain most of the variation in results.

Key Findings

Different studies answer different questions and we report on these key findings with the caveat that there are few consistent findings across studies. Most studies support commonly held views that agricultural productivity in SSA declined or stagnated

NOTE: The findings and conclusions contained within this material are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

through the 1970s and 1980s. Productivity increased in the 1990s, but was still below rates in other regions of the world (Tables 2 & 8). The estimated average annual SSA TFP growth rate across studies, and over all periods, ranges from .61% to 1.83% compared to a range of 1.29% to 2.1% for the world (Table 1). There is less evidence from 2000 to 2007 (the last year for which FAO data are available), but growth rates appear to have fallen from their 1990 levels (Tables 2 & 7). Though continuously high growth rates are hard to maintain as baselines rise with any positive growth in the previous period, annual rates for Africa in the first five years of the new century fluctuate widely from -5% to 2.8% (Table 4).

World and regional aggregate measures mask significant cross-country variation in overall growth and sources of that growth. In the 1980–2000 period, one study estimates that world TFP grew at an average 2.1% annually, with China experiencing 6% annual growth and eight SSA countries experiencing negative growth (Table 3). Several studies present evidence of significant regional variation within Africa, demonstrating faster growth in southern and western Africa than other regions (Tables 5 & 6).

The composition of TFP growth also varies across countries and regions. Change in TFP is composed of technical efficiency change (catching up to existing technology) and technical change (innovation in technology), which contribute to overall TFP growth in different magnitudes. Approximately half of the SSA and South Asian countries in Coelli and Rao’s (2005) study experienced more growth due to technical change than efficiency change over the period (Table 3). Alternatively decomposing TFP growth in African regions into crop and livestock components reveals that livestock productivity has grown faster than crop productivity, with the exception of 1961 to 2001 in Southern Africa and 1981 to 2001 in West Africa (Table 6). Another study finds that within livestock productivity growth has been different between nonruminants and ruminants (Table 10).

There is much more consensus among the estimates of PFP since most rely largely on the same data and there is less methodological debate in their calculation. Global trends in land and labor productivity since 1961 reflect faster growth in global agricultural output than in the use of land and labor inputs, though this long-run trend masks a considerable slowdown in growth since 1990.^{6,7,8} The following example illustrates the different PFP measures and estimation methodologies with a simplified model of one country.

Illustrating Partial Factor Productivity Measures & Estimation Methodology

To illustrate some different partial productivity measures, we present a simplified example of a country that produces only three goods (Crop X, Crop Y and Meat Z) and has 2 harvests per year. In practice, multiple outputs and inputs (numerator and denominator) are multiplied by prices to convert them into comparable units that can be added up. This is not necessary when only a single input or output is being considered, such as with a crop yield measure, which can then be reported in physical units.

		Notes
<i>Input Parameters</i>		
Harvested Area (hectares)	2,000	Counts each unit of land as many times as it is harvested
Arable Land (hectares)	1,000	Counts each unit of land only once per year
Labor (number of agricultural workers)	200	
Livestock (number of meat animals)	500	
<i>Output Parameters</i>		
Crop X (tonnes)	4,000	
Crop Y (tonnes)	2,000	
Meat Z (tonnes)	100	
<i>Productivity Measures</i>		Methodology
Land Productivity per Harvested Area	3.05	Total Production (X, Y & Z)/Harvested Area
Land Productivity per Arable Area	6.1	Total Production (X, Y & Z)/Arable Area
Labor Productivity	30.5	Total Production (X, Y & Z)/Agricultural workers
Crop X Yield*	2 tonnes/hectare	Total Production (X)/Harvested Area
Meat Z Yield*	200 kilos/animal	Total Production (Z)/Animals

*Assumes equal allocation of land to the production of the three goods

Total Factor Productivity in Agriculture

Table 1 summarizes estimates of TFP from the most recent studies. We report the most recent year groupings from each study at the world and/or regional aggregate.

Table 1. *Agricultural Total Factor Productivity Growth Rate, Global and Regional Comparisons*

Study	Sample Years	Countries Included (n)	Average Annual Agricultural TFP Growth Rate, Crops and Livestock (%)	Region
WORLD				
Fuglie (2010)	1990 – 2007	171	1.45	World
Fuglie (2008)	2000 – 2006	171	1.55	World
Nin-Pratt & Yu (2010)	1984 – 2006	63	1.46	Developing Regions
Ludena et al. (2007)	1981 – 2000	116	1.29	World
Coelli & Rao (2005)	1980 – 2000	93	2.1	World
AFRICA				
Fuglie (2008)	2000 – 2006	171	0.61	Sub-Saharan Africa
Nin-Pratt & Yu (2010)	1984 – 2006	63	1.91	Sub-Saharan Africa
Nin-Pratt & Yu (2008)	1994 – 2003	30	1.83	Sub-Saharan Africa
Alene (2010)	1970 – 2004	52	1.8	Africa
			1.6	Sub-Saharan Africa
Block (2010)	1985 – 2002	44	1.24*	Sub-Saharan Africa
Dias Avila & Evenson (2010)	1981 – 2001	37	1.68	Africa
Nkamleu (2008)	1970 – 2001	16	0.1	Africa
Fulginiti, Perrin & Yu (2004)	1985 – 1999	41	1.9	Sub-Saharan Africa
SOUTH ASIA				
Fuglie (2008)	2000 – 2006	171	1.36	South Asia
Nin-Pratt & Yu (2010)	1984 – 2006	63	1.69	South Asia
Dias Avila & Evenson (2010)	1981 – 2001	5	2.34	South Asia

*Note: this study does not include livestock

1. World Aggregate Total Factor Productivity Estimates

Three studies calculate agricultural total factor productivity at the global level: Fuglie (2008), Fuglie (2010), and Coelli and Rao (2005).

Fuglie (2008) & Fuglie (2010)

Fuglie (2008 and 2010) uses an alternative methodology, using representative input cost data from country-level case studies. However, for countries where reliable input cost data are not available (including Sub-Saharan Africa), the author uses econometrically estimated input production elasticities as weighting factors to construct an aggregate measure of input growth. This method is valid as long as producers maximize profit and markets are in long-run competitive equilibrium. He includes 171 countries, aggregating some national data to create consistent political units over time but creating a complete accounting of global agricultural production.⁹ Fuglie also notes additional limitations to his methodology, including holding revenue and cost shares constant over time and making adjustments for quality with respect to land but not for any other inputs. Additionally, the model only estimates TFP changes, and thus cannot be used to compare TFP levels across countries. Fuglie (2008) does not find evidence for a slowdown in sector-wide agricultural TFP. Table 2 summarizes his 2010 findings.

Table 2. Agricultural Total Factor Productivity Growth by Decade (average annual % change)

Region	1970 – 1979	1980 – 1989	1990 – 1999	2000 – 2006
World	0.60	0.94	1.60	1.55
Developed Countries	1.62	1.48	2.25	1.76
Developing Countries	0.55	1.67	2.31	2.08
Sub-Saharan Africa	-0.37	0.94	1.47	0.61
South Asia	0.66	2.02	1.71	1.36

Source: Fuglie, 2008, p. 439

Coelli & Rao (2005)

Coelli and Rao (2005) estimate the agricultural TFP for 93 countries between 1980 and 2000. The countries included account for 97% of the world's agricultural output and 98% of the world's population.¹⁰ Whereas many of the earlier studies found evidence for a technological regression, Coelli and Rao (2005) do not find evidence to support such a regression, likely a consequence of the different sample period and expansion of included countries.¹¹ Table 3 summarizes their results for key countries of concern in South Asia and SSA. China is also reported since it was the country with the single fastest TFP growth over the period in the study.

Table 3. Agricultural Productivity Growth Rate by country, 1980–2000 (average annual % change over period)

Region/ Country	Average Annual TFP Growth Rate, weighted by production shares	Efficiency Change Component (catching up)	Technical Change Component (technical innovation)
World (93 countries)	2.1	0.9	1.2
Asia	2.9		
Africa	0.6		
China	6.0	4.4	1.5
Burundi	4.6	1.5	3.0
Angola	3.7	6.1	-2.4
Nigeria	3.7	1.6	2.0
South Africa	3.7	1.4	2.3
Sudan	2.4	1.6	0.8
Bangladesh	2.4	0.7	1.7
Ghana	2.2	1.0	1.2
Malawi	2.2	1.3	0.9
Senegal	2.1	0.8	1.3
Mozambique	1.9	3.1	-1.2
Cote d'Ivoire	1.4	0.0	1.4
India	1.4	0.8	0.6
Cameroon	0.9	0.0	0.9
Zimbabwe	0.8	-0.3	1.1
Kenya	0.5	0.0	0.5
Tanzania	0.3	1.3	-1.0
Madagascar	-0.2	0.8	-1.0
Niger*	-0.2	-0.5	0.4
Burkina Faso	-0.3	-1.0	0.7
Mali	-1.7	-1.8	0.1
Uganda	-2.3	0.0	-2.3
Rwanda	-3.3	0.0	-3.3
Guinea	-3.6	0.6	-4.2
Chad	-5.3	0.0	-5.3

Source: Coelli & Rao, 2005; *discrepancy due to rounding

2. Regional Total Factor Productivity Estimates

Several studies report TFP estimates at regional aggregates for Asia and Africa including Alene (2010), Block (2010), Dias Avial & Evenson (2010), Nin-Pratt and Yu (2008), and Fulginiti, Perrin and Yu (2004).

Alene (2010)

Alene (2010) estimates the historical TFP for Africa, using a methodology that accounts for the time lag in the impact of agricultural research and development on agricultural output. The author finds an average annual agricultural TFP growth rate for Africa of 1.6% over the period 1970–2004. *Table 4* presents the annual growth rate of African agricultural TFP using this methodology for the most recent five years reported in the study.

Table 4. Agricultural TFP Annual Growth Rates in Africa (average annual % change)

Year	TFP Growth Rate
2000	0.8
2001	2.3
2002	-0.5
2003	2.8
2004	0.7

Source: Alene, 2010, p. 231

Block (2010)

Block (2010) estimates the historical TFP for Sub-Saharan Africa, applying a different methodology than previously used. The most important difference for comparative purposes is the inclusion of crops only, excluding livestock.¹² Block argues that input quality is already reflected in output and thus requires no adjustment in the econometric model. *Table 5* summarizes his calculations for African regions in the periods 1960 to 1984 and 1985 to 2002.

Table 5. TFP Growth Rates among African Regions (average annual % change over period)

Region	1960 – 1984	1985 – 2002	1960 – 2002
East Africa	0.23	0.19	0.21
Southern Africa	0.84	1.80	1.25
Central Africa	-2.43	0.61	-1.13
West Africa	0.37	1.61	0.90
Sahel	-2.41	0.48	-1.17
Sub-Saharan Africa Total	0.14	1.24	0.61

Source: Block, 2010, p. 84

Dias Avila & Evenson (2010)

Dias Avila and Evenson (2010) calculate historical agricultural TFP growth for Africa from 1961 to 2001, disaggregated by livestock and crops, using data from 37 African and 21 Asian countries. *Table 6* summarizes their findings for African and Asian regions.

Table 6. Regional Agricultural TFP Growth Rates, disaggregated by sub-sector (average annual % change over period)

Region	Crops		Livestock		Aggregate	
	1961 – 1980	1981 - 2001	1961 – 1980	1981 - 2001	1961 – 1980	1981 - 2001
South Asia	1.42	2.14	2.34	2.76	1.71	2.34
East Africa	0.35	0.62	0.75	0.97	0.68	0.95
Central Africa	0.97	0.54	1.18	1.32	1.09	0.68
West Africa	0.99	3.22	1.73	1.13	1.19	2.93
Southern Africa	2.06	1.12	1.60	0.26	1.80	0.79

Source: Dias Avila & Evenson, 2010, p. 3781

Nin-Pratt and Yu (2008) calculate agricultural TFP for 30 countries in SSA between 1964 and 2003. When disaggregated by country, their analysis shows that Nigeria accounts for over half of the TFP growth in the region over the entire 1964 to 2003 period. *Table 7* summarizes their findings by decade and also presents the most recent results with and without the inclusion of Nigeria.

Table 7. Decomposed Agricultural Productivity Growth Rate in 30 African Countries (average annual % change over period)

Period	Average Annual TFP Growth Rate	Efficiency Change Component (catching up)	Technical Change Component (technical innovation)
1964 – 1973	-2.35	-2.79	0.46
1974 - 1983	-1.67	-1.70	0.03
1984 - 1993	1.65	1.59	0.06
1994 – 2003, including Nigeria	1.83	1.63	0.19
1994 – 2003, excluding Nigeria	1.48	1.16	0.31

Source: Nin-Pratt & Yu, 2008, p. 13

Fulginiti, Perrin & Yu (2004)

Fulginiti, Perrin and Yu (2004) estimate the agricultural TFP growth in 41 SSA countries between 1960 and 1999. They examine the different performance of countries according to their former colonial power. The authors find that former British colonies tend to exhibit better productivity growth than other countries, with former French colonies performing in the middle and former Belgian colonies and Liberia performing worst.¹³ *Table 8* summarizes their aggregate findings of African TFP growth rates by decade.

Table 8. Average Annual Agricultural TFP Growth Rates in Sub-Saharan Africa by Decade, 1960 – 1999 (average annual % per decade)

Decade	TFP Growth Rate
1960s	0.68
1970s	-0.32
1980s	1.29
1990s	1.62

Source: Fulginiti, Perrin & Yu, 2004, p. 176

3. Country-Level Total Factor Productivity Estimates

Several studies report TFP calculations disaggregated by country. Those studies that report only country level data (Heady et al. and Nkamleu) have not been previously discussed in this review. *Table 9* summarizes their findings for BMGF priority countries (as of this writing) in SSA and South Asia.

Table 9. Average Annual TFP Growth, Study Comparisons (average annual % change over period)

Country	Study: Years:	Coelli & Rao (2005) 1980 - 2000	Alene (2010) 1970 - 2004	Dias Avila & Evenson (2010) 1981 – 2001	Headey, Alauddin & Rao (2010) 1986 – 2001	Fuglie (2008) 1990 – 1999	Nin-Pratt & Yu (2008) 1994 – 2003	Nkamleu (2008) 1970 – 2001
Bangladesh		2.4		1.30				
Burkina Faso		-0.3	0.4	2.73			1.32	-5.0
Burundi		4.6	-1.4					
Ethiopia			0.7	1.52			2.55	
Ghana		2.2	0.9	3.93	2.5		1.79	-0.2
India		1.4		2.41		1.74		1.3
Kenya		0.5	1.8	0.50			1.05	
Madagascar		-0.2	0.1	-0.37			-0.03	
Malawi		2.2	2.0	-1.24	5.5		3.35	2.4

Mali	-1.7	0.1	-1.45		2.85	-1.1
Mozambique	1.9	-0.6	1.04	1.7	3.32	0.9
Nigeria	3.7	2.8	3.75	2.4	2.12	-3.6
Rwanda	-3.3	4.8	-3.18			
Tanzania	0.3	0.8	-0.63		2.79	
Uganda	-2.3	4.2	0.67	2.3		0.1
Zambia		1.1	-0.70		0.03	

4. Projected Future Total Factor Productivity Growth

Projecting future productivity growth requires estimating historical TFP growth. Ludena et al. (2007) is the only study identified that provides forecasts of agricultural productivity growth. The authors present time series evidence for global TFP growth among disaggregated agricultural sectors (crops, ruminants, and nonruminant livestock). “Nonruminant” refers to pigs and poultry.¹⁴ Notably, their model is the first to present disaggregated agricultural TFP and the TFP of sub-sectors within agriculture (as opposed to the partial productivity measures used in other sub-sector analyses). Their model includes 116 countries, and is thus sensitive to the set of countries included.¹⁵ *Table 10* summarizes their results.

In addition to historical estimates, the authors also project disaggregated TFP growth through 2040. The authors estimate weighted average agricultural TFP to grow at the rate of 1.38% globally, at 1.16% in South Asia, and 0.78% in SSA.¹⁶ In comparison with the historical TFP estimates presented in *Table 1*, the global projected growth rate of 1.38% is roughly 13% below the median estimate in that range of studies reviewed here. They suggest that most regions in their sample are likely to experience greater gains in livestock than crop productivity. Within livestock, the nonruminant sector is projected to continue to be more dynamic than the ruminant sector. Rapid rates of livestock and crop productivity growth observed recently suggest a convergence of developing countries to developed country productivity levels. For ruminants, however, productivity rates in developing countries appear to be diverging from developed country levels.¹⁷

Table 10. Historical and Projected Agricultural TFP, with sub-sector decomposition (average annual % change over period)

Region/Group	Period	Crops	Ruminants	Nonruminants	Weighted Average*
World	1961 – 1980	0.49	0.15	1.50	0.60
	1981 – 2000	0.95	1.10	2.71	1.29
	2001 - 2040	0.94	0.82	3.60	1.38
Industrialized Countries	1961 – 1980	1.97	0.83	1.29	1.49
	1981 – 2000	0.97	0.59	1.17	0.89
	2001 - 2040	1.14	0.27	0.63	0.77
China	1961 – 1980	-0.03	-0.88	1.88	0.48
	1981 – 2000	1.52	6.67	4.81	2.88
	2001 - 2040	1.45	3.01	6.60	3.11
South Asia	1961 – 1980	-0.37	-0.69	1.12	-0.39
	1981 – 2000	0.72	1.40	2.66	0.94
	2001 - 2040	0.96	1.48	3.48	1.16
Sub-Saharan Africa	1961 – 1980	-0.57	0.24	0.62	-0.34
	1981 – 2000	0.88	0.49	0.38	0.77
	2001 - 2040	0.91	0.57	-0.05	0.78

Source: Ludena et al., 2007, p. 5; *Weighted average uses 2001 output shares to show overall agricultural TFP growth

Partial Factor Productivity Measures

Partial factor productivity (PFP) measures include land and labor productivity. Proxy indicators of PFP growth measure the productivity of a single input or output, such as seed or fertilizer productivity and crop yield or livestock yield. PFP measures provide a useful measure of the change in agricultural productivity, and generally reflect whether technical change in a given location has been primarily land- or labor-saving.¹⁸ Although they are useful for indicating the factor saving components of technical change, they are likely to overstate total efficiency gains since they do not account for changes in other inputs.^{19,20} In addition, since PFP measures lump together a broad range of intensification processes, such as changes in input use and quality, the ability to attribute growth in long-run productivity trends is limited.²¹ *Appendix VII* reports agriculture value added (as percent of GDP) in SSA, India and Bangladesh since 1995, demonstrating the economic importance of agriculture relative to the rest of the economy.

Table 11. Partial Factor Productivity Measures & Indicators

Measure	Definition	Unit
Land Productivity	Total Production (all crop and livestock) per hectare arable land	Constant 2000 US\$
Labor Productivity	Total Production (all crop and output) per agricultural workers (Agriculture Value Added per Worker)	Constant 2000 US\$
Proxy Indicators	Definition	
Seed Productivity	Total or Single Crop Production per units of seed	
Fertilizer Productivity	Total or Single Crop Production per units of fertilizer	
Crop Yield	Single Crop Production per hectare planted	Tonnes per Hectare
Livestock Yield	Total or Single Meat/Milk Production per animal	Kilos per Animal

1. Land & Labor Productivity

Land and labor productivity measure the amount of agricultural output per hectare of agricultural land or per worker. Changes in the agricultural population or amount of arable land change the land-to-labor ratio and thus drive changes in the corresponding PFP measures.²² Global trends in land and labor productivity since 1961 reflect growth in global agricultural output compared to the use of land and labor.^{23,24} Specifically, world cropland grew by only 11% between the early 1960s and late 1990s while the world population nearly doubled, reducing cropland per capita by 40%. Productivity growth additionally contributed to the considerable improvement in global nutritional levels and decrease in real food prices, reducing the amount of land needed to produce a given amount of food by 56%.²⁵ However, the long-run trend masks a considerable slowdown in productivity growth since 1990, compared with the preceding three decades.²⁶ *Table 12* provides several estimates of annual land and labor productivity growth from the empirical literature. Unlike the TFP measures, the same methodology is generally used to estimate partial productivity, however similarly to the case of the TFP estimates, differences derive from the countries and time periods included in each analysis.

Table 12. Agricultural Land & Labor Productivity Growth Rate Estimates (average annual % change over period)

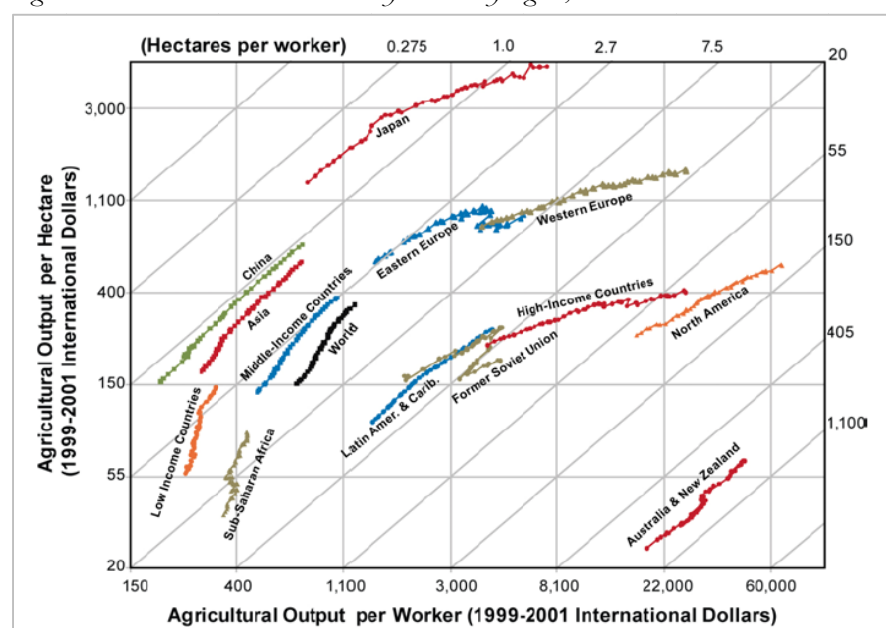
Study	Sample Years	Countries Included (n)	Average Annual Land Productivity Growth Rate	Average Annual Labor Productivity Growth Rate	Region
WORLD					
Alston et al., 2010	1961 – 1990	212	2.03	1.12	Global
Fuglie, 2008	1990 – 2006	171	1.95	1.51	Global
Alston et al., 2010	1990 – 2005	212	1.82	1.36	Global
Fuglie, 2008	1970 – 1989	171	1.96	1.25	Global
AFRICA					
Block, 2010	1961 – 2007	45	1.24	0.41	SSA
Block, 2010	2001 – 2007	45	1.65	2.18	SSA
Alston et al., 2010	1990 – 2005		2.21	0.90	Africa

Piess & Thirtle, 2010	1985 – 2003		0.80	Africa
Alston et al., 2010	1961 – 1990	2.18	0.68	Africa
Piess & Thirtle, 2010	1961 – 1985		0.015	Africa
ASIA				
Alston et al., 2010	1961 – 1990	2.56	1.83	Asia
Alston et al., 2010	1990 – 2005	3.01	2.72	Asia
Piess & Thirtle, 2010	1985 – 2003		1.56	Asia
Piess & Thirtle, 2010	1961 – 1985		1.34	Asia

Alston et al. (2009a,b) measure global land and labor productivity between 1961 and 2005. They find that global land productivity, the aggregate output of 185 crops and livestock breeds per harvested and pastured area, grew an average 1.96% per year between 1961 and 2005.²⁷ This amounts to a 2.4-fold increase in aggregate global output per harvested area since 1961.²⁸ Similar to crop yield trends, average land productivity growth slowed from 2.03% per year in the 1961–1990 period to 1.82% per year between 1990 and 2005. Global labor productivity, output per agricultural worker, grew 1.2% per year on average between 1961 and 2005.²⁹

Figure 1 depicts regional trends in land and labor productivity from 1961 to 2005. The data set includes all 212 countries that existed during the time period. The horizontal axis measures labor productivity and the vertical axis measures land productivity. The productivity lines are composed of a series of annual data points representing the ratio of the value of agricultural output (185 plant and animal commodities in 1999 – 2001 at purchasing power parity prices) to the quantity of land and labor inputs. Land includes all permanently harvested and pastured land and labor is a head count of the economically active workers in agriculture. The annual data point is then scaled by the corresponding output-to-input ratio for the 1961 base year.³⁰ The length of the productivity line indicates the average annual rate of change. The diagonal gridlines indicate constant land-to-labor ratios. As a productivity line for a particular country crosses a diagonal (from left to right), it indicates a decrease in unit of labor per harvested or pastured land area.³¹ For example, land-labor ratios have risen 83% in North America over the time period. In SSA, on the other hand, agriculture has become much more labor intensive and consequently land-labor ratios have declined. In 1961, the regional average was ten hectares per worker, which dropped to five hectares per worker by 2005.³²

Figure 1. Land and Labor Productivity Trends by region, 1961–2005



Source: Alston, Beddow & Pardey, 2010, p. 54; Graphical technique from Hayami & Ruttan, 1971

Changes in land and labor productivity may be largely independent of each other in any given setting, depending on the source of productivity growth.³³ Advances in mechanical technology are largely associated with labor productivity growth while advances in biological technology are primarily associated with land productivity growth. There are, nevertheless, exceptions to this analytical distinction and some technical change involves complimentary advances in both mechanical and biological technology.³⁴ For instance, using global data, Restuccia et al. (2008) found high labor productivity to be positively associated with the extent of intermediate input use (such as chemical fertilizers, improved seeds and more efficient power sources).³⁵ Pingali and Heisey (1999) also found rising labor productivity in Asia to be associated with the increasing adoption of labor saving technologies.³⁶

Recent trend data suggest that there are wide differences between land and labor productivity both among countries and among major world regions. Ruttan (2002) argues that three broad groups of country and regional growth paths emerge: a) land constrained, whereby land productivity has risen faster than labor productivity; b) land abundance where labor productivity has risen faster than land productivity; and c) an intermediate path where land and labor productivity grow at relatively comparable rates.³⁷ Comparing developed and developing countries, Ruttan suggests that internal resource endowments (land and livestock), modern technical inputs (machinery and fertilizer) and human capital (general and technical education) each account for approximately one quarter of the differences in labor productivity between developed and developing countries. Additionally, the presence of economies of scale in developed countries accounts for another 15% of the difference.³⁸

Nin-Pratt and Yu (2008) grouped countries in SSA according to similar productivity growth patterns. Kenya and Tanzania experienced an increase in land productivity with little increase in labor productivity. Countries in this group have increased animal stocks and fertilizer use, for example, in order to prevent reductions in labor productivity as land productivity changes.³⁹ Ethiopia, Mali and Mozambique are the priority countries that group according to a second pathway with a growing rural population but an even faster increase in yields, suggesting that output per worker also increased. In order to achieve this labor productivity, these countries also increased animal stocks and fertilizer use per worker. Malawi, Ghana, Burkina Faso and Nigeria group together according to a third pathway. These countries experienced increases in both labor and land productivity, but with labor productivity growth outpacing yield growth. These trends could be explained by a relatively slow growth in the number of agricultural workers, or rapid growth in agricultural land.⁴⁰

Global or regional partial productivity measures are sensitive to the countries included, especially including or excluding China in a multi-country dataset.⁴¹ Alston et al. (2009a,b) found that average labor productivity growth occurred faster in the 1990 – 2005 period (1.36% per year) than it had between 1961 and 1990 (at 1.12% per year). However, when China is removed from the global data, both labor and land productivity growth rates have been slower since 1990 than the above estimate. China experienced most of its growth during these years, and when it is eliminated from the global data there is an even more substantial decrease in average global land and labor productivity growth after 1990 than experienced in the previous three decades.⁴²

Estimates are likewise sensitive to countries included within SSA. According to Block's (2010) calculation, Nigeria has experienced significantly greater growth in land and labor productivity than any other country, and with other priority countries substantially behind.⁴³ However, World Development Indicator data is unavailable for this indicator in Nigeria. Burkina Faso is the second highest-ranking priority country in terms of labor productivity growth but is ninth among SSA countries. Malawi and Ethiopia rank fourth and seventh among SSA countries, respectively, in land productivity growth.⁴⁴ Nin-Pratt and Yu (2008) estimate land, labor and input use in SSA both including and excluding Nigeria from the dataset. Including Nigeria changes some of the general patterns for the region. Nigeria alone accounts for 72% of the reduction in fertilizer use over the 1984–2003 period and also experienced a greater increase in the number of tractors per hectare and per worker along with slower growth in the number of workers per hectare.⁴⁵ *Table 13* presents land and labor productivity estimates from two country-level analyses in SSA.

Table 13. Land & Labor Productivity Estimates by country, Sub-Saharan Africa (average annual % growth)

Region/ Country	Land Productivity Growth (Output per hectare)		Labor Productivity Growth (Output per hectare)	
	Block 2010 (1961–2007)	Nin-Pratt & Yu, 2008 (1994 – 2003)	Block 2010 (1961–2007)	Nin-Pratt & Yu, 2008 (1994 – 2003)
Burkina Faso	1.65	1.25	1.74	2.76
Burundi	0.79		-0.47	
Ethiopia	2.25	2.49	-0.18	1.79
Ghana	1.41	1.57	0.6	2.92
Kenya	2.17	1.30	0.15	0.11
Madagascar	0.62		-0.41	
Malawi	2.62	3.23	1.46	4.78
Mozambique	0.2	2.79	-0.15	2.75
Nigeria	3.16	2.02	3.43	2.08
Tanzania	1.73	0.74	0.28	0.09
Uganda	0.83		-0.48	

Appendices 1 through 4 contain annual land and labor productivity measures and average annual productivity growth for priority countries for every year from 1995 to 2008. Table 14 presents a summary of the previous five years of land and labor productivity growth in priority countries. Our calculation of land productivity is based on total production per hectare of arable land, though some other estimates use total harvested area (including pasture land) while others are not explicit about the particular land measure used. While this table provides a snapshot of current trends, it is sensitive to the baseline year. Inter-annual change fluctuates substantially due to a variety of factors and could indicate, among other things, either general productivity growth or recovery from a particularly poor season in the previous year. Specifically, Malawi experienced an historically terrible harvest in 2005, explaining both the large negative productivity growth rate between 2004 and 2005 as well as the substantial gain in productivity from 2005 to 2006.

Table 14. Recent Land and Labor Productivity Growth Rates (average annual % change) in priority countries

	Land Productivity Growth (Production per Hectare Arable Land)					Labor Productivity Growth (Agricultural value added per worker)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Burkina Faso	-9.4	19	0.5	-29	11.4	-6.3	7.7	-1.1		
Burundi	1.5	5.1	4.5	0	0	-3.8	-9.8			
Ethiopia	-3.8	5.8	-3	-3.8	10	13.4	10.1	8.3	5.9	4.4
Ghana	9.1	4.4	-2.9	-4.1	11	7.5	2	2.5	-0.3	2.8
Kenya	-2	2.4	6.8	1.3	-8.5	-0.5	4.6	2.3	0.3	-6.7
Madagascar	5.3	13.6	1	-6.5	0	-2.6	-2.2	-0.2	1.1	-0.3
Malawi	-1.2	-15	39.8	13.9	-12.8	0.7	-10.4	9.5	3.3	2.6
Mozambique	1.8	7.6	4.2	-6.2	7.9	2.6	4.4	8.8	5.7	7.5
Nigeria	2.8	0.2	1.9	-8.1	7.6					
Tanzania	33.4	-1.3	7.2	3.8	-1.5	3.6	2.9	1.5		
Uganda	-2.3	-3.8	-1.9	1	0.5	-10.3	8.7	-1.8	-3.2	6.1

2. Crop & Livestock Yield

Interpreting global crop yields is challenging because countries differ in their ability to plant multiple crops per year and cropping intensities have changed considerably over time for certain regions. Most studies report yields based on output per harvested area, which effectively counts the same area as many times as it is cropped during the year:⁴⁶ for example, if a hectare of land produces 2 tons of rice for each of two harvests per year, the yield reported would be “4 tonnes rice/2 hectares land.” However, if the intensity of crop plantings per year increases over time, reporting yields based on harvested area may understate the yield growth rate compared to reporting yields based on arable area. For example, if rice yields averaged 2 tons per harvested hectare in 1961 and doubled to 4 tons per harvested hectare by 2007, average annual yield growth would be

1.5%. In contrast, if yields per harvested area doubled from 2 to 4 tons per hectare from 1961 to 2007 while the cropping intensity also increased from one to two crops per year, yields reported on the basis of arable area would have grown from 2 to 8 tons per arable hectare, or 3.1 percent per year. In such cases, yield measured on the basis of total arable land would measure annual changes in land productivity more accurately (in terms of the total annual output from a given piece of land).⁴⁷

Changes in yields can reflect changes in agroclimatic, resource, and technological conditions as well as changes in economic factors such as input availability.⁴⁸ In their analysis of global maize, rice and wheat yields from 1950 – 1994, Naylor et al. (1997) find that yield variability in the developing world did not increase over that period, with the exception of increasing maize yield variability after 1980 in Africa.⁴⁹

Appendix V presents average crop yields for priority crops from 2005–2009 in SSA, India and Bangladesh. Global crop yields (in metric tonnes of output per harvested hectare) of maize, rice, wheat and soybeans grew rapidly from 1961 to 2007; however, this growth occurred more slowly after 1990 than in the earlier part of the period.⁵⁰ *Appendix VI* presents average annual yield growth of priority crops in focus countries between 2005 and 2009.

Cereal Crops

Cereal yields have increased significantly in some countries in Latin America and Africa, while other countries across the world demonstrate a more variable pattern of performance.⁵¹ The productivity growth rate of rice and wheat has declined in recent years, particularly in the lowlands of Asia.⁵² In SSA, cereal crop output and productivity growth rates were particularly low in the period 1970–1999, with population growth outstripping food production gains in several areas.

Rice output in Asia grew an average 2.1% per year from 1955–1965 and 2.9% from 1965–1980. An expansion of harvested area accounts for a portion of this growth, especially prior to the 1970s, with the adoption of modern rice varieties primarily accounting for the growth in the 1965–1980 period. However, rice yield growth in Asia declined sharply beginning in the 1980s.⁵³ Pingali & Heisey (1999) suggest that there is potential to expand the yield frontier for rice in the medium to long term due to recent progress in plant breeding.⁵⁴

In developed countries, global wheat yields actually declined during the 1990–2007 period.⁵⁵ Significant declines in wheat yields in the former Soviet Union significantly influenced global averages for the 1990–2007 period. Including former Soviet bloc countries, wheat yields grew by 0.52% per year on average, however this increases to 0.73% when former USSR countries are excluded.⁵⁶ Within developing countries, wheat yields grew an average 2% per year between 1956 and 1995. Yields in China and India grew particularly quickly during this period. Wheat yields across Africa have varied much more over time and display less consistent patterns than other regions.⁵⁷ While the yield frontier has expanded upwards at about 1% per year since the Green Revolution, Pingali & Heisey (1999) note that evidence for continued yield progress is mixed.⁵⁸

Global maize yields grew an average 1.77% per year between 1990 and 2007, more slowly than the 2.20% average annual growth during the 1961–1990 period.⁵⁹ Global rice yields grew less than 1% per year on average between 1990 and 2007, less than half their average growth rate for the 1961–1990 period.⁶⁰ Over the entire 1956 to 1995 period, maize yields did not increase as much as those of wheat and rice. Growth rates of maize do not display the same patterns as the other major cereals, with yield performance fluctuating seemingly more randomly, particularly in SSA.⁶¹ Pingali & Heisey (1999) argue that the yield frontier could be readily expanded, theoretically, through technology transfer from industrialized nations.⁶²

Roots & Tubers

In contrast to cereal crops, expanded land area and yield increases contributed almost equally to the output growth of roots and tubers between 1983 and 1996, accounting for 57% and 43%, respectively.⁶³ The CGIAR Technical Advisory Committee on roots and tubers noted in 1997 that there was substantial unrealized yield potential in the crops. They argued that technology to deal with yield-limiting and yield-reducing factors such as water, soil nutrients, pests and diseases simply do not exist.⁶⁴ Yield growth rates of roots and tubers in SSA averaged 1.53% per year from 1983 to 1996. India experienced an

average annual growth rate of 1.6% during the same period, while other Southeast Asian countries averaged only 0.24% annual yield growth.⁶⁵ However, crop disaggregated data (*Table 15*) demonstrates substantial variation among crops in each region.

Table 15. Roots and Tubers Yield Growth Rates (average annual % change), 1983–1996

	Cassava	Potato	Sweet Potato	Yam	All Roots & Tubers
India	2.28	1.30	0.85		1.60
Southeast Asia	-0.01	2.82	0.59	4.85	0.24
Sub-Saharan Africa	1.15	-0.08	-0.86	3.46	1.53
World	0.46	0.67	0.64	3.29	0.46

Source: Scott, Rosegrant & Ringler, 2000, p. 18. Blanks indicate no data available.

Scott et al. (2000) also projected roots and tubers yield trends to 2020 under a conservative scenario projecting modest income growth and increase in demand for roots and tubers as well as conservative estimates of technological change. They project average annual roots and tubers yield growth at 1.41% in SSA, 1.6% in India and 0.6% in Southeast Asia.⁶⁶ The authors anticipate that more than half of global roots and tubers output growth will take place in SSA, and largely in cassava and yam. They argue that this output growth will come more from increasing yield and less from expanding land.⁶⁷

Livestock Yield

The labor-to-land ratio of a country or region is associated with the share of livestock in agriculture and can partly explain global trends in livestock yield. Nin et al. (2007) compare the share of different livestock products (meat, milk) between groups of countries with similar labor-to-land ratios, arguing that initial animal stocks are higher where the labor-to-land ratio is low since they are labor saving inputs to production, for example in Latin America and South Africa. They find that countries with a high labor-to-land ratio produce less beef, sheep, and goat meat per animal (ruminants) but more pig meat per animal (non-ruminant) than those with a low labor-to-land ratio. Poultry meat production per animal did not demonstrate a significant difference.⁶⁸

Table 16 presents regional livestock yield growth trends for the period 1981–2000. Nin et al. (2007) examined yield growth trends from 1961 to 2000 and demonstrate that yield growth explains almost half the growth in poultry meat production in East and South Asia. In SSA, although poultry meat production has grown, rapid output and yield growth in South Africa in the 1960s and 1970s largely influences the regional average. In the beef and milk sectors, on the other hand, output growth has occurred at a slower pace than in the poultry sector. The transformation of the dairy sector and expansion of beef production largely explain output growth in South Asia. SSA is the region that has shown the slowest growth in ruminant production, and expanded animal stocks largely explain the growth that has occurred.⁶⁹

Table 16. Livestock Yield Growth (average annual % change), 1981 – 2000

	Beef	Milk	Chicken	Eggs
Sub-Saharan Africa	0.18	2.11	0.95	0.37
South Asia	1.89	2.78	3.53	1.90

Source: Nin et al., 2007, p. 2499

According to the FAO (2003), there is a substantial yield gap in cattle yield (beef and milk per cow) between developing and industrialized countries. Developing country beef yields were 163 kg per animal in 1997–1999 compared with an average 284 kg per animal in industrialized countries. Over the same time period, developing country milk yields were 1.1 tonnes per year per cow compared with 5.9 tonnes in industrialized nations.⁷⁰

3. Projected Future Trends in Partial Factor Productivity Growth

As countries develop, agricultural systems shift from traditional, low productivity agriculture to modernizing agriculture and finally to industrialized agriculture. In this structural transformation, per capita incomes rise and the share of agriculture in a country's GDP and the proportion of the labor force employed in agriculture both decline.⁷¹ Other factors apart from, though

generally highly correlated with, a country's stage in this transformation process also influence the shape of the food system, and thus agricultural productivity. Such factors include the institutions, infrastructure, capacity and size of the transactions costs that determine the investment environment.⁷² Outside investors will prefer countries where the regulatory environment is transparent and easy to negotiate, where arbitration costs are low, and where coordination is easy to manage. These factors influence the cost of developing and managing the supply chains that drive the structural transformation of food systems.⁷³

Ruttan (2002) notes that opportunities exist to enhance agricultural productivity substantially in countries with land and labor productivity levels furthest from the existing scientific and technical frontiers, especially those in SSA. He also suggests that land endowments may influence the particular nature of productivity growth. Ruttan (2002) argues that land constrained countries, such as India, can be expected to follow a productivity growth path that emphasizes biological technology. On the other hand, countries that are still expanding their agricultural land frontier and also confronting yield constraints on older agricultural land, such as Brazil, can be expected to follow a productivity growth path that is more balanced between biological and mechanical technology. Finally, relatively land abundant countries, such as many in SSA, will be expected to follow a productivity growth path that emphasizes labor saving mechanical technology. However, gains in labor productivity depend upon the demand for labor in rural nonfarm sectors, which in turn creates the incentive to substitute mechanical technology in place of labor in agricultural production.⁷⁴

Future yield trend projections vary substantially, depending on the methodology and parameter assumptions employed.⁷⁵ Projecting global yield growth to 2050, Tweeten and Thompson (2008) estimate a linear yield growth function assuming no increase in land area.⁷⁶ Their estimates project 0.83% annual yield growth in cereals, 0.45% in roots and tubers, 0.5% in pulses and 0.7% in fruits and vegetables.⁷⁷ Rosegrant et al. (2008) project 1.01% annual cereal yield growth for the period 2000–2050, though they estimate higher growth (1.59% per year) in SSA.⁷⁸

Harris and Kennedy (1999) point out that optimistic estimates likely presume exponential growth in future yield trends with increased investment in agriculture and continuing improvements in technology. They suggest a more realistic estimate fits a logistic curve to observed yields to make future predictions. The log curve imposes an upper limit, which accounts for the earth's carrying capacity limits, whereas the exponential curve increases infinitely.⁷⁹ In the early stages both curves appear similar. As the upper limit starts to exert more influence in the logistic curve, the rate of yield growth slows ultimately to zero as the carrying capacity is approached. Harris and Kennedy's (1999) analysis suggests that, in general, a doubling of yields is a more realistic estimate for global agriculture to 2050 than the tripling yield projection posited by many in the optimistic camp.⁸⁰

Conclusion

TFP and PFP measures of agricultural productivity lend different strengths to an analysis of trends over time. While there is consensus in the literature that TFP is theoretically a better measure of an economy's overall efficiency, methodological debates yield a wide range of estimates. PFP measures are simpler to estimate and there is generally methodological consensus, however since they fail to account for changes in other inputs, partial measures are more limited in their ability to explain productivity changes over time.

Please direct comments or questions about this research to Leigh Anderson, at eparx@u.washington.edu.

Appendix I. Labor Productivity (Agriculture Value Added per Worker, constant 2000 US\$)

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
Year														
1995		186.54	161.56	263.48	333.86	105.65	200.57	339.37	118.33	142.69	189.21	93.50	270.31	376.98
1996		190.16	183.02	267.23	337.99	130.08	200.31	345.64	125.10	156.06	217.50	94.66	279.57	409.39
1997		188.12	180.89	267.91	318.16	127.32	198.84	349.12	132.84	145.81	207.44	97.78	294.36	394.19
1998		187.37	158.51	267.62	335.16	137.04	197.97	355.48	139.72	165.13	206.00	99.56	301.87	414.19
1999		193.98	159.07	273.45	349.52	146.95	199.61	357.91	144.67	162.44	203.44	97.81	314.52	420.36
2000		200.10	158.74	277.50	336.86	150.98	196.87	360.20	124.78	151.51	202.24	91.32	336.42	414.59
2001		204.57	168.56	287.51	367.34	138.75	199.80	365.30	134.08	171.27	209.68	86.11	343.72	434.88
2002		207.22	160.27	295.79	346.37	127.29	192.25	372.21	145.79	169.75	233.56	87.11	341.11	398.34
2003		200.21	139.06	301.42	346.80	129.40	190.13	348.02	150.47	180.99	217.74	81.16	349.48	432.69
2004		179.65	157.63	312.24	345.13	130.36	185.24	374.03	154.45	169.52	213.74	78.10	362.06	496.39
2005		195.32	173.52	321.38	361.05	116.81	181.21	381.60	161.27	182.52	218.90	70.44	368.73	515.17
2006		191.88	187.99	326.19	369.20	127.92	180.82	391.18	175.51	180.57	215.30		386.00	526.60
2007		185.74	199.07		370.25	132.08	182.83	390.10	185.44		211.61		404.90	546.97
2008		197.10	207.75		345.32	135.52	182.19	401.07	199.36		236.59		417.57	549.29

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Cent. Afr. Republic	Chad	Congo	Cote d'Ivoire	Dem. Rep. Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
Year														
1995	89.10	455.18	685.50	450.74	332.09	218.32		699.06	216.52	80.32		121.15	1339.25	232.74
1996	99.65	493.85	672.13	478.14	342.84	221.93		716.37	217.25	80.58		112.50	1351.74	217.28
1997	107.32	513.91	619.88	507.45	359.45	235.80		717.41	208.24	78.02		110.54	1410.02	224.15
1998	110.26	539.78	570.09	535.27	368.04	252.03		750.35	202.36	75.74		168.60	1429.31	214.36
1999	108.99	553.78	560.58	565.44	378.59	239.00		737.61	204.03	74.11		150.33	1438.28	268.10
2000	116.29	579.70	530.95	585.18	398.55	228.16	351.42	821.68	177.49	73.54	836.97	81.82	1528.62	287.27
2001	133.62	587.27	521.32	606.19	418.62	244.84		821.38	167.38	73.83	805.44	101.11	1581.92	303.00
2002	145.48	618.37	478.84	625.60	413.03	237.05		802.34	164.70	74.48	795.00	89.32	1513.62	210.92
2003	158.57	620.20	543.35	645.85	395.71	240.42		815.10	162.85	75.48	860.58	75.25	1551.32	245.49
2004	175.76	643.55	487.90	666.06	401.77	220.13		849.38	159.85	77.61	850.81	69.85	1585.41	272.65
2005	200.02	660.64	458.86	680.63	398.84			863.16	160.71	78.38	920.77	114.01	1662.80	272.77
2006	213.77		446.59	698.80	408.77			874.25	161.41	80.49	931.57	119.98	1724.56	268.11
2007	251.40		474.85	730.31				888.47	163.90		1024.65	118.64	1834.88	266.22
2008	249.17		467.02					891.79	165.89		993.20		1860.31	270.90

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
Year														
1995	157.5	264.3	233.0		414.6	1469.8	236.7	262.4		1897.9	570.7	361.5	241.3	262.0
1996	159.3	298.7	226.0		423.0	1603.5	229.4	246.6		2377.2	663.0	410.3	234.5	308.9
1997	163.4	318.6	219.5		437.7	1500.0	227.6	238.3		2426.7	773.3	415.9	218.0	314.5
1998	170.0	253.6	251.9		445.4	1557.8	266.0	234.2		2328.0	788.1	393.5	216.4	332.0
1999	181.0	267.2	270.0		480.3	1627.2	244.9	259.6		2504.7	780.8	403.9	234.0	349.7
2000	177.7	273.2	255.6	572.1	424.0	1732.1	217.6	259.3	329.1	2663.7	781.2	375.5	233.7	360.2
2001	196.4	271.2	286.3		465.6	1607.7	238.7	256.1		2617.6	820.1	373.3	224.3	346.9
2002	197.6	265.9	201.2		440.6	1763.7	236.2	194.4		2835.0	841.1	391.6	217.6	269.6
2003	301.7	278.7	201.8		508.5	1829.2	243.2	228.5		2904.8	837.2	381.5	225.7	269.1
2004	306.6	290.1	207.6		475.0	1849.6		227.0		3032.6	826.5	386.9	231.9	263.6
2005	305.8	302.0	181.4		501.6	1950.4		246.0		3159.7	821.9	394.2	227.3	239.1
2006	312.3	313.0	207.9		520.7	1928.5		221.0		3064.4	849.1		228.7	
2007	315.7	319.9	190.7		523.5	1771.4		202.0		3221.9	860.7		225.2	
2008	321.1	325.4	189.0			1727.5		235.2		3662.9	883.3		220.5	

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Appendix II. Annual Percentage Change in Labor Productivity

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
<i>Year</i>														
1995-96		1.9	13.3	1.4	1.2	23.1	-0.1	1.8	5.7	9.4	15.0	1.2	3.4	8.6
1996-97		-1.1	-1.2	0.3	-5.9	-2.1	-0.7	1.0	6.2	-6.6	-4.6	3.3	5.3	-3.7
1997-98		-0.4	-12.4	-0.1	5.3	7.6	-0.4	1.8	5.2	13.2	-0.7	1.8	2.6	5.1
1998-99		3.5	0.4	2.2	4.3	7.2	0.8	0.7	3.5	-1.6	-1.2	-1.8	4.2	1.5
99-2000		3.2	-0.2	1.5	-3.6	2.7	-1.4	0.6	-13.8	-6.7	-0.6	-6.6	7.0	-1.4
2000-01		2.2	6.2	3.6	9.0	-8.1	1.5	1.4	7.5	13.0	3.7	-5.7	2.2	4.9
2001-02		1.3	-4.9	2.9	-5.7	-8.3	-3.8	1.9	8.7	-0.9	11.4	1.2	-0.8	-8.4
2002-03		-3.4	-13.2	1.9	0.1	1.7	-1.1	-6.5	3.2	6.6	-6.8	-6.8	2.5	8.6
2003-04		-10.3	13.4	3.6	-0.5	0.7	-2.6	7.5	2.6	-6.3	-1.8	-3.8	3.6	14.7
2004-05		8.7	10.1	2.9	4.6	-10.4	-2.2	2.0	4.4	7.7	2.4	-9.8	1.8	3.8
2005-06		-1.8	8.3	1.5	2.3	9.5	-0.2	2.5	8.8	-1.1	-1.6		4.7	2.2
2006-07		-3.2	5.9		0.3	3.3	1.1	-0.3	5.7		-1.7		4.9	3.9
2007-08		6.1	4.4		-6.7	2.6	-0.3	2.8	7.5		11.8		3.1	0.4

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Cen. Afr. Republic	Chad	Congo	Cote d'Ivoire	Dem. Rep. Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
<i>Year</i>														
1995-96	11.8	8.5	-2.0	6.1	3.2	1.7		2.5	0.3	0.3		-7.1	0.9	-6.6
1996-97	7.7	4.1	-7.8	6.1	4.8	6.2		0.1	-4.1	-3.2		-1.7	4.3	3.2
1997-98	2.7	5.0	-8.0	5.5	2.4	6.9		4.6	-2.8	-2.9		52.5	1.4	-4.4
1998-99	-1.2	2.6	-1.7	5.6	2.9	-5.2		-1.7	0.8	-2.2		-10.8	0.6	25.1
99-2000	6.7	4.7	-5.3	3.5	5.3	-4.5		11.4	-13.0	-0.8		-45.6	6.3	7.2
2000-01	14.9	1.3	-1.8	3.6	5.0	7.3		0.0	-5.7	0.4	-3.8	23.6	3.5	5.5
2001-02	8.9	5.3	-8.1	3.2	-1.3	-3.2		-2.3	-1.6	0.9	-1.3	-11.7	-4.3	-30.4
2002-03	9.0	0.3	13.5	3.2	-4.2	1.4		1.6	-1.1	1.3	8.2	-15.7	2.5	16.4
2003-04	10.8	3.8	-10.2	3.1	1.5	-8.4		4.2	-1.8	2.8	-1.1	-7.2	2.2	11.1
2004-05	13.8	2.7	-6.0	2.2	-0.7			1.6	0.5	1.0	8.2	63.2	4.9	0.0
2005-06	6.9		-2.7	2.7	2.5			1.3	0.4	2.7	1.2	5.2	3.7	-1.7
2006-07	17.6		6.3	4.5				1.6	1.5		10.0	-1.1	6.4	-0.7
2007-08	-0.9		-1.6					0.4	1.2		-3.1		1.4	1.8

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
Year														
1995-96	1.1	13.0	-3.0		2.0	9.1	-3.1	-6.0		25.3	16.2	13.5	-2.8	17.9
1996-97	2.6	6.7	-2.8		3.5	-6.5	-0.8	-3.4		2.1	16.6	1.4	-7.1	1.8
1997-98	4.1	-20.4	14.7		1.8	3.9	16.9	-1.7		-4.1	1.9	-5.4	-0.7	5.6
1998-99	6.4	5.4	7.2		7.8	4.5	-7.9	10.8		7.6	-0.9	2.6	8.1	5.3
99-2000	-1.8	2.2	-5.3		-11.7	6.4	-11.2	-0.1		6.3	0.1	-7.0	-0.1	3.0
2000-01	10.5	-0.7	12.0		9.8	-7.2	9.7	-1.2		-1.7	5.0	-0.6	-4.0	-3.7
2001-02	0.6	-1.9	-29.8		-5.4	9.7	-1.0	-24.1		8.3	2.6	4.9	-3.0	-22.3
2002-03	52.7	4.8	0.3		15.4	3.7	2.9	17.5		2.5	-0.5	-2.6	3.7	-0.2
2003-04	1.6	4.1	2.8		-6.6	1.1		-0.6		4.4	-1.3	1.4	2.8	-2.0
2004-05	-0.3	4.1	-12.6		5.6	5.5		8.4		4.2	-0.6	1.9	-2.0	-9.3
2005-06	2.2	3.7	14.6		3.8	-1.1		-10.2		-3.0	3.3		0.6	
2006-07	1.1	2.2	-8.3		0.5	-8.1		-8.6		5.1	1.4		-1.5	
2007-08	1.7	1.7	-0.9			-2.5		16.4		13.7	2.6		-2.1	

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Appendix III. Land Productivity (Total Production per Hectare Arable Land, Constant 2000 US\$)

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
Year														
1995	537	696	257	247	367	395	438	816	209	206	966	643	998	569
1996	596	681	301	263	395	438	447	830	233	230	1002	648	1049	595
1997	631	688	302	241	386	429	453	722	243	206	991	642	1057	600
1998	618	738	280	268	438	446	445	752	255	240	1082	599	1081	615
1999	646	772	299	267	427	470	460	792	268	236	1118	617	1244	642
2000	650	787	314	262	409	532	448	778	248	183	1164	586	1328	623
2001	642	823	323	296	437	544	458	787	262	230	1005	632	1303	648
2002	634	854	342	350	439	428	444	849	239	235	1142	654	1339	579
2003	669	828	328	273	448	493	460	876	257	252	1010	639	1371	664
2004	687	809	315	364	439	488	485	956	262	228	1009	649	1339	648
2005	689	778	334	359	449	415	551	998	282	272	1087	682	1565	684
2006	701	764	324	385	480	580	556	969	293	273	1124	713	1604	723
2007	645	771	312	400	486	660	520	929	275	194	1074	713	1705	794
2008	694	775	343	394	444	576	520	1031	297	216	1026	713	1765	792

Note: Based on 1995-2008 FAO data for total crop output (Total Production, Constant 2000 US\$) and total arable land (Hectares) as of February 24, 2011.

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Cent. Afr. Republic	Chad	Congo	Cote d'Ivoire	Dem. Rep. Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
Year														
1995	158	523	80	264	156	157	1045	416	302	6237	211	156	402	328
1996	161	530	94	284	171	170	1088	412	311	6344	218	148	425	247
1997	155	517	89	269	181	192	1184	397	302	6536	220	138	435	298
1998	188	492	99	289	183	209	1252	402	292	6630	215	212	454	297
1999	174	491	102	299	176	189	1321	392	309	6901	220	173	447	380
2000	211	517	74	307	181	174	1419	384	318	6989	227	104	461	369
2001	251	500	136	312	188	211	1338	376	324	7248	222	117	451	350
2002	278	524	117	319	183	205	1356	369	328	7386	210	77	457	229
2003	281	515	154	339	177	200	1409	371	337	7253	213	88	460	277
2004	314	523	126	338	181	198	1365	372	352	7205	210	85	457	326
2005	333	509	119	368	180	201	1441	373	357	7723	210	122	459	277
2006	343	507	129	372	186	186	1471	373	368	5620	207	137	464	282
2007	356	492	124	359	194	163	1463	376	353	5478	210	157	473	194
2008	361	523	124	351	197	187	1533	376	369	7122	205	157	474	253

Note: Based on 1995-2008 FAO data for total crop output (Total Production, Constant 2000 US\$) and total arable land (Hectares) as of February 24, 2011.

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
<i>Year</i>														
1995	891	358	89	292	260	53	42	242	553	236	126	184	152	264
1996	821	379	161	350	202	61	50	214	586	311	147	207	186	381
1997	779	409	153	451	212	84	39	190	620	309	141	214	173	392
1998	747	437	132	482	230	64	68	188	560	286	143	205	165	382
1999	716	434	136	523	244	67	59	285	485	310	136	192	197	361
2000	690	426	128	550	181	76	52	285	437	334	137	178	187	421
2001	638	444	169	536	240	77	66	255	382	308	159	198	186	376
2002	636	458	137	520	218	80	74	144	338	333	145	200	204	285
2003	622	461	124	518	269	82	78	232	345	320	148	202	221	273
2004	607	473	119	534	271	90	62	229	322	326	133	208	243	278
2005	566	503	111	559	271	90	78	261	298	343	129	191	274	213
2006	535	514	121	551	256	101	87	216	281	307	136	199	252	215
2007	528	520	113	610	256	105	91	184	274	304	136	205	253	223
2008	515	515	96	591	287	105	118	273	273	370	122	212	262	188

Note: Based on 1995-2008 FAO data for total crop output (Total Production, Constant 2000 US\$) and total arable land (Hectares) as of February 24, 2011.

Appendix IV. Annual Percentage Change in Land Productivity

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
<i>Year</i>														
1995-96	11.1	-2.1	17.3	6.7	7.7	10.8	2.0	1.7	11.7	11.3	3.7	0.7	5.1	4.6
1996-97	5.7	1.0	0.1	-8.5	-2.2	-2.0	1.4	-13.1	4.2	-10.5	-1.1	-0.9	0.7	0.9
1997-98	-2.1	7.2	-7.1	11.2	13.4	4.0	-1.9	4.2	4.7	16.9	9.3	-6.7	2.3	2.4
1998-99	4.7	4.7	6.5	-0.3	-2.5	5.2	3.5	5.3	5.2	-1.7	3.3	3.0	15.1	4.5
99-2000	0.6	1.8	5.0	-1.9	-4.2	13.2	-2.7	-1.7	-7.5	-22.4	4.1	-5.1	6.8	-3.0
2000-01	-1.3	4.7	2.9	13.0	6.9	2.2	2.3	1.1	5.7	25.4	-13.6	7.8	-1.9	4.0
2001-02	-1.2	3.8	6.0	18.2	0.4	-21.3	-3.1	7.9	-8.7	2.1	13.6	3.5	2.8	-10.6
2002-03	5.5	-3.1	-4.1	-22.0	2.0	15.3	3.7	3.1	7.6	7.3	-11.5	-2.2	2.4	14.8
2003-04	2.8	-2.3	-3.8	33.4	-2.0	-1.2	5.3	9.1	1.8	-9.4	-0.1	1.5	-2.3	-2.5
2004-05	0.2	-3.8	5.8	-1.3	2.4	-15.0	13.6	4.4	7.6	19.0	7.7	5.1	16.9	5.5
2005-06	1.9	-1.9	-3.0	7.2	6.8	39.8	1.0	-2.9	4.2	0.5	3.4	4.5	2.5	5.8
2006-07	-8.1	1.0	-3.8	3.8	1.3	13.9	-6.5	-4.1	-6.2	-29.0	-4.4	0.0	6.3	9.8
2007-08	7.6	0.5	10.0	-1.5	-8.5	-12.8	0.0	11.0	7.9	11.4	-4.5	0.0	3.5	-0.2

Note: Based on 1995-2008 FAO data for total crop output (Total Production, Constant 2000 US\$) and total arable land (Hectares) as of February 24, 2011.

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Cen. Afr. Republic	Chad	Congo	Cote d'Ivoire	Dem. Rep. Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
<i>Year</i>														
1995-96	2.2	1.3	17.9	7.5	9.9	8.1	4.1	-1.0	2.9	1.7	3.3	-5.2	5.8	-24.5
1996-97	-4.1	-2.5	-5.5	-5.5	5.9	12.6	8.9	-3.6	-2.9	3.0	0.6	-6.8	2.3	20.4
1997-98	21.2	-4.9	11.1	7.7	0.9	9.3	5.7	1.3	-3.3	1.4	-2.3	53.4	4.3	-0.2
1998-99	-7.3	-0.1	2.9	3.4	-3.5	-9.8	5.5	-2.5	5.6	4.1	2.4	-18.4	-1.7	27.8
99-2000	21.2	5.3	-26.7	2.6	2.6	-7.8	7.4	-2.2	3.2	1.3	3.2	-39.6	3.2	-3.0

2000-01	19.1	-3.3	82.9	1.6	3.9	20.9	-5.7	-2.1	1.9	3.7	-2.1	11.8	-2.0	-5.0
2001-02	10.7	4.9	-13.8	2.4	-2.8	-2.6	1.3	-1.9	1.3	1.9	-5.3	-34.1	1.2	-34.6
2002-03	1.1	-1.8	31.3	6.1	-3.3	-2.5	3.9	0.6	2.7	-1.8	1.2	14.3	0.7	20.7
2003-04	11.8	1.6	-18.2	-0.1	2.3	-1.0	-3.2	0.4	4.5	-0.7	-1.3	-3.8	-0.6	17.7
2004-05	5.9	-2.7	-5.4	8.6	-0.5	1.3	5.6	0.2	1.4	7.2	0.0	43.9	0.3	-14.9
2005-06	3.2	-0.5	7.8	1.3	3.6	-7.5	2.0	0.0	2.9	-27.2	-1.3	12.8	1.2	1.9
2006-07	3.8	-2.9	-3.3	-3.5	4.2	-12.3	-0.5	0.7	-4.0	-2.5	1.4	14.6	1.9	-31.2
2007-08	1.3	6.3	0.0	-2.2	1.3	14.6	4.8	0.0	4.5	30.0	-2.2	0.0	0.1	30.2

Note: Based on 1995-2008 WDI data for agriculture value added per worker (constant 2000 US\$) as of February 24, 2011. Blanks indicate no data available in this date range.

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
Year														
1995-96	-7.8	6.0	82.3	19.8	-22.2	14.3	19.4	-11.7	5.9	31.8	16.8	12.8	22.0	44.2
1996-97	-5.1	7.8	-5.3	29.0	4.8	37.0	-22.4	-11.1	5.8	-0.8	-3.5	3.2	-7.1	3.0
1997-98	-4.0	6.9	-13.7	6.8	8.7	-23.9	75.4	-1.3	-9.7	-7.5	1.0	-4.4	-4.3	-2.8
1998-99	-4.2	-0.7	3.4	8.6	5.9	5.2	-13.5	52.1	-13.3	8.6	-5.0	-6.2	19.6	-5.5
99-2000	-3.7	-1.8	-5.8	5.0	-25.7	14.3	-11.2	-0.3	-9.9	7.7	1.1	-7.2	-5.3	16.7
2000-01	-7.6	4.1	31.5	-2.5	32.3	1.3	26.5	-10.3	-12.5	-7.9	15.9	11.0	-0.5	-10.5
2001-02	-0.3	3.2	-18.9	-2.9	-9.0	4.0	11.5	-43.5	-11.6	8.3	-8.9	1.0	9.5	-24.2
2002-03	-2.2	0.6	-9.5	-0.5	23.0	2.1	5.3	60.9	1.9	-4.1	2.3	1.3	8.6	-4.5
2003-04	-2.4	2.8	-4.1	3.1	0.8	9.0	-19.8	-1.3	-6.5	1.9	-10.3	2.7	10.1	2.0
2004-05	-6.7	6.2	-6.4	4.7	0.2	1.0	24.8	14.0	-7.5	5.1	-3.2	-8.0	12.5	-23.2
2005-06	-5.5	2.3	8.4	-1.4	-5.6	11.5	11.6	-17.5	-5.9	-10.4	5.5	4.1	-7.9	0.8
2006-07	-1.4	1.2	-6.4	10.7	-0.2	3.8	4.3	-14.7	-2.3	-1.0	0.1	3.4	0.3	3.5
2007-08	-2.6	-1.0	-15.4	-3.2	12.4	0.0	30.1	48.5	-0.4	21.7	-10.1	3.0	3.6	-15.6

Note: Based on 1995-2008 FAO data for total crop output (Total Production, Constant 2000 US\$) and total arable land (Hectares) as of February 24, 2011.

Appendix V. Average Yield of Major Crops (2005-2009)

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
Crops														
<i>(tonnes/hectare)</i>														
Bananas	4.56	7.11	7.08	15.20	19.49	5.54	7.19	6.43		5.00	5.40	16.59	35.62	
Barley		1.35	2.23	3.13									0.85	2.02
Beans, dry	0.51	0.96	0.70	0.45	0.46	1.05					0.74	0.90	0.78	0.37
Cashew nuts, with shell	1.98		1.02	5.00			0.41	0.56	1.07	0.39				0.72
Cassava	11.56	13.13	9.36	10.30	17.71	7.54	13.01	6.29	2.16	6.50	8.57			32.55
Chick peas		0.52	1.19	0.45	0.36	0.41							0.77	0.82
Chillies & peppers, dry	1.59	0.90	0.39	1.15	0.98	0.53	0.97	6.49					1.18	1.61
Cocoa beans	0.44	0.35		0.76			0.79	0.40						0.34
Coffee, green	1.42	0.61	0.72	0.41	0.30	0.89	0.53	0.17	0.60		0.58	0.87		0.81
Cow peas, dry	0.67	1.04		0.40	0.47	0.69	0.83			0.47				
Groundnuts, with shell	1.68	0.70	1.16	0.72	1.24	0.85	0.91	1.14	0.32	0.70	0.58	0.73	1.37	1.12
Leguminous vegetables			4.53	5.23	5.00									
Maize	1.82	1.49	2.20	1.14	1.57	1.65	1.50	1.61	0.86	1.65	0.81	1.04	5.72	2.12
Millet	1.68	1.69	1.22	0.82	0.66	0.64		0.98	0.43	0.86	0.80	1.08	0.68	0.92
Oats			1.06		1.14			0.66						
Oil palm fruit	2.65			14.44			11.67	5.94				10.83		
Oilseeds		0.68	0.52	0.69	0.44				0.33				0.77	0.29
Pigeon peas		1.02		0.72	0.51	0.81						0.90	0.78	0.72
Plantains	6.00	5.51		1.95	15.20	9.48		10.32			7.11			
Potatoes	3.40	6.90	7.54	5.20	5.91	13.36	5.88		13.23	2.00	9.17	2.67	15.46	18.40
Pulses	0.41		0.81	0.89	0.23		1.00	0.09	0.50	1.00			0.87	0.51
Rapeseed			1.09										0.89	1.08
Rice, paddy	1.54	1.37	1.85	1.79	3.02	1.64	2.56	2.16	0.92	2.17	4.44	3.39	3.91	3.20
Seed cotton	0.99	0.68	0.79	0.73	0.44	0.95	0.84	0.80	0.55	1.22		0.99	2.23	1.22
Sesame seed	0.52	0.60	0.83	0.40	0.38				0.68	0.49			0.90	0.37
Sorghum	1.24	1.48	1.55	0.96	0.81	0.71	0.56	1.05	0.56	1.03	1.11	1.28	1.45	0.90
Soybeans	0.95	1.18	1.06	0.38	0.83	0.72	1.00			1.12	0.62	0.80		1.10
Spices	1.39		0.50		0.69	0.65	1.33			1.87	0.78		3.74	1.96
Sugar cane	22.81	68.11	100.6	108.2	88.46	108.8	32.11	25.44	13.03	100.0	19.06	71.80	38.49	66.87
Sweet potatoes	2.96	4.50	7.82	2.73	11.73		7.04	1.39	7.22	9.71	5.86	6.69	9.28	8.83
Vegetables	8.10	7.31	2.76	6.82	8.81	8.78	8.28	7.86	5.53	8.08	7.36	11.36	6.88	12.26
Wheat	1.45	1.72	1.67	2.05	2.18	1.52	2.42		1.18		0.87	0.84	1.96	2.71
Yams	11.31		7.40	5.67	7.55			13.53		7.10	2.66	5.84		
Livestock														
<i>(kilos/animal)</i>														
Buffalo meat													80	138
Buffalo milk, whole													403.1	1599
Cattle meat	130.0	149.9	108.4	107.6	149.7	205.0	127.5	125.0	150	110	104	127.9	70.22	102.7
Cow milk, whole	240.0	350	214.6	173.5	543.9	450.5	302.8	130	170	110	478.0	351.4	205.0	1139
Poultry Meat	1	1.3	0.8	0.91	1.21	0.80	0.8	0.98	0.9	0.8	0.9	0.9	0.70	0.9
Goat Meat	12.7	12	8.5	12	11	12	15	13.08	12	8.1	11	10	6.96	10
Sheep Meat	11.0	13.9	10.0	12.0	12.0	14.0	12.0	15.0	12.0	9.0	12.0	12.0	7.0	12.0

Note: Based on 2005-2009 FAO Data as of February 24, 2011. Average yield estimates are the unweighted average of country-level annual yields from 2005-2009. Blanks indicate no data available in this date range.

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Ken. Afr. Republic	Chad	Congo	Cote d'Ivoire	Dem. Rep. Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
Crops														
<i>(tonnes/ hectare)</i>														
Bananas	9.68	5.28		9.56	6.13		7.98	44.9	3.74		4.44		6.43	
Barley									0.64			0.80		
Beans, dry	0.30	0.82		0.89		0.53	0.78	0.87	0.54	0.27		0.07		
Cashew nuts, with shell	0.39	0.28						0.40						
Cassava	12.48	13.9		6.86	3.01	9.37	9.13	7.57	8.09		2.50		5.10	3.00
Chick peas												0.54		
Chillies & peppers, dry		1.08		1.36	0.91			1.26	3.90	1.10				
Cocoa beans	0.09			0.37	0.05		0.32	0.60	0.30		0.10		0.07	
Coffee, green	0.03	0.20		0.29	0.41		0.30	0.30	0.39		0.37		0.41	
Cow peas, dry				0.98					0.48					
Groundnuts, with shell	0.34	0.94	1.00	0.59	1.02	0.80	0.60	0.92	0.78			1.08	1.03	0.86
Leguminous vegetables														
Maize	0.62	1.27	0.22	1.93	0.87	1.02	0.80	2.14	0.78	1.63		0.74	1.64	1.00
Millet	0.31	0.80	0.12	1.13	1.00	0.56	0.79	0.89	0.66			0.62		0.93
Oats														
Oil palm fruit	12.17	10.8		21.4	7.56		12.5	6.10	6.55		10.0		7.99	10.0
Oilseeds		1.00						0.25				0.43		
Pigeon peas														
Plantains				5.46	2.91		7.56	4.02	4.49		5.08		5.47	
Potatoes	8.30	3.00		3.00	2.56	8.50	8.83		4.63			4.65		
Pulses		1.06	0.68	0.63	0.96	0.78		0.71	0.42			0.64	0.67	0.25
Rapeseed														
Rice, paddy	0.60	2.74		1.30	1.62	1.41	0.74	1.81	0.76				2.12	1.12
Seed cotton	1.07	1.20	2.27	1.22	0.51	0.62		0.96	0.42					0.39
Sesame seed	0.26	0.76		0.11	0.64	0.38	0.50	0.50	0.45			0.42		0.32
Sorghum		0.92	0.93	1.16	0.95	0.74		0.56	0.66			0.90		1.10
Soybeans		0.65		0.60				0.97	0.48				1.05	
Spices														
Sugar cane	37.9	28.5		10.0	7.20	100	35.9	63.4	39.4				59.3	
Sweet potatoes	5.60	3.18		4.19		2.53	7.04	2.15	5.01		2.57		1.79	
Vegetables	7.74	6.51	4.71	7.87	8.01	9.64	6.89	8.12	5.38	5.73		2.50	6.56	5.45
Wheat	1.82		1.53	1.33		1.64			1.28			0.70		
Yams		10.3		7.62	6.83	9.54	4.84	8.46	4.40				7.04	
Livestock														
<i>(kilos/ animal)</i>														
Buffalo meat														
Buffalo milk, whole														
Cattle meat	170.2	110.0	197.8	144.2	168.1	120.0	156.0	114.0	155.6	109.8	110.0	109.0	132.0	120.0
Cow milk, whole	484.2	130.0	350.0	500.0	261.7	270.0	500.0	142.8	833.3	349.6		196.0	250.0	175.0
Poultry Meat	0.9	0.8	0.8	0.8	0.8	0.7	1.0	0.9	0.6		0.8	0.9	0.8	1.0
Goat Meat	15.0	10.0	12.0	10.0	18.5	12.0	9.0	9.4	11.1	12.5	11.0	8.5	10.0	11.0
Sheep Meat	15.0	10.0	14.0	12.0	15.0	17.8	10.0	14.1	10.0	10.4	11.0	10.0	12.0	11.0

Note: Based on 2005-2009 FAO Data as of February 24, 2011. Average yield estimates are the unweighted average of country-level annual yields from 2005-2009. Blanks indicate no data available in this date range.

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
Crops														
<i>(tonnes/ hectare)</i>														
Bananas	3.86	9.91		10.95	51.73			25.89		49.86	32.26	10.80	3.27	4.75
Barley			0.25							2.77			0.94	5.35
Beans, dry			0.25				0.50			1.26	2.19	0.35		0.51
Cashew nuts, with shell	0.96	0.42			0.39			0.30				1.43		
Cassava	7.88	11.11		6.38	16.45		22.05	7.68	5.00		1.69	6.30	4.73	4.33
Chick peas							0.55				1.84			0.71
Chillies & peppers, dry					0.68		0.73	7.65	3.14	1.37	0.96	0.39	1.11	0.78
Cocoa beans	0.66			0.17					0.35			0.73		
Coffee, green	0.45			0.21					1.64			0.27	0.90	1.21
Cow peas, dry		0.15			0.32		0.23	0.38		0.52	0.22			
Groundnuts, with shell	1.46	1.06		0.61	0.96	0.51	0.44	0.82	0.77	1.60	0.83	0.67	0.68	0.45
Leguminous vegetables							3.05							
Maize	1.72	1.64	0.53		2.01	2.16	0.95	1.74	0.84	3.87	1.56	1.18	1.98	0.53
Millet	1.03	1.36			0.82	0.24	0.48	0.68	1.00	0.57	0.31	0.68	0.82	0.20
Oats			1.51							1.53				2.25
Oil palm fruit	2.68	8.42		10.76				10.00	8.12			8.51		
Oilseeds							0.50			1.28				0.50
Pigeon peas														
Plantains	5.19	2.87		2.21					5.21					
Potatoes	6.10		16.64		23.09		10.09	15.40		33.74	16.83		9.78	16.00
Pulses	0.87	0.63		0.63	0.60	1.14	0.36	0.50	0.68		0.88	0.94	0.48	0.56
Rapeseed										1.09				
Rice, paddy	1.83	1.71		1.42	2.65		2.80	2.87	1.01	2.33	3.76	2.27	1.32	2.40
Seed cotton	1.16	1.34			0.92	1.50	1.20	1.12		2.23	1.35	0.60	1.12	0.65
Sesame seed	0.24				0.32		0.57	0.46	0.61		0.22	0.28		
Sorghum	1.04	0.97	0.41		0.98	0.31	0.39	0.86	1.05	2.86	0.63	0.99	0.67	0.29
Soybeans				0.40	1.24					1.71			1.20	1.56
Spices							1.57		3.57			1.00	0.71	0.79
Sugar cane	53.51	27.41		10.20	70.62		54.47	116.2	70.00	63.97	105.19		104.2	79.26
Sweet potatoes	3.68			10.00	18.47		16.37	25.07	2.49	3.18	13.37	6.78	14.67	2.17
Vegetables	4.01	5.10	8.63	5.00	5.46	5.18	7.24	4.31	6.21	15.10	3.57	4.96	6.49	6.90
Wheat			0.40		2.50	5.64	1.51			2.81	2.53		5.86	3.24
Yams	12.10			8.65	23.60						2.40	10.29		
Livestock														
<i>(kilos/ animal)</i>														
Buffalo meat														
Buffalo milk, whole														
Cattle meat	96.5	110.0	130.0	125.0	130.0	233.9	125.9	163.7	259.2	121.5	125	160	225	96.5
Cow milk, whole								359.9					430.0	
	185.0	170.0	250.0	130.0	245.0	500	250	8	3503	362.3	225	300	2	185.0
Poultry Meat								1.137	1.533					
	1.0	0.7	0.8	0.8	0.8	0.8	0.8	1	04	1	0.8	1	1.15	1.0
Goat Meat	12.2	9.0	9.0	9.0	14.0	12	12	10.94	16.08	13	9	12	12	12.2
Sheep Meat	11.4	10.0	10.0	10.0	12.5	18	16	14.78	18.76	15.92	11	14	14	11.4

Note: Based on 2005-2009 FAO Data as of February 24, 2011. Average yield estimates are the unweighted average of country-level annual yields from 2005-2009. Blanks indicate no data available in this date range.

Appendix VI. Average Annual Percent Change in Yield of Major Crops (2005-2009)

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
<i>Crops (average % change in yield per year)</i>														
Bananas			-2.8	4.3	0.6	0.0	-1.4	25.0				0.7	-0.3	2.8
Barley														
Beans, dry		-3.9	17.1	1.0	5.2	7.7	-0.1				4.8	-0.5	1.2	4.5
Cashew nuts w/ shell	1.0			-0.5			0.7	-0.4	16.6	0.4				4.1
Cassava	2.0	-3.2		4.4	13.2	7.8	-0.4	2.1	2.1	3.2	-0.8	2.8		3.0
Chick peas			7.2	-0.8	2.0	-0.3							0.8	2.1
Chillies & peppers, dry	0.7		0.1				0.0	-0.1					1.6	1.3
Cocoa beans	2.0	-0.1		-0.5			-0.4	0.1						1.1
Coffee, green	1.5	0.5	1.3	-1.2	9.1	3.2	2.8	-0.9			1.8	-0.5		-2.2
Cow peas, dry														
Groundnuts w/ shell	1.7	0.9	5.1	0.2		14.6 ^a	-7.9	14.2	0.8	-2.6	-2.1	-0.1	1.5	0.1
Legumes			-0.1	-0.8										
Maize	4.5	-1.1	4.7	4.2	-5.0	31.1 ^a	-1.1	2.3	4.7	2.5	-2.4	-3.5	3.1	2.3
Millet	5.0	3.4	4.6	1.9	2.8	19.8 ^a		10.9	-6.2	-3.1		1.5	-0.5	-0.3
Oats			18.3		-1.1			-0.3						
Oil palm fruit	1.2							-0.9						
Oilseeds			7.2										-6.1	-1.9
Pigeon peas		0.3		-0.6	-3.8	29.2 ^a							21.3	3.0
Plantains	0.6	1.2			0.6	-0.7		3.4			-0.5			
Potatoes														
Pulses	-0.5		-0.5	2.3	0.3				0.0				-1.0	5.2
Rapeseed														
Rice, paddy	6.6	-3.2	1.1	3.5	-12.4	28.2 ^a	-2.4	2.1	0.0	13.1	-0.4	-0.8	0.9	-1.2
Seed cotton	10.3	26.5	0.1	9.1	-0.2	20.4 ^a	-4.4	-0.2	10.2	5.5		1.8	1.8	1.7
Sesame seed	1.3	0.4	9.8	-0.5					0.4	4.5			-9.6	-3.1
Sorghum	-0.4	-0.2	4.8	1.5	-12.9	49.5 ^a	5.0	11.2	1.9	-2.0	-1.0	1.2	3.4	4.9
Soybeans														
Spices	0.2									0.0			7.9	-3.2
Sugar cane	4.0	-0.7	-8.4	-2.6	0.3	-0.1	-0.7	0.0	2.9		6.4	0.0	-1.3	0.1
Sweet potatoes														
Vegetables	6.5		0.1		0.1	0.3	1.0	-0.3		0.1	0.1		2.5	3.0
Wheat	12.6	0.1	6.1	-17.6	-11.5	24.8 ^a	0.7		3.5		-1.0	-0.4	10.2	2.2
Yams	0.7		3.0	-0.1	-12.7			5.1		-2.8	-0.2	-0.2		
<i>Livestock (average % change in yield per year)</i>														
Buffalo meat														-0.2
Buffalo milk, whole													0.0	0.5
Cattle meat	0.0		0.0	-0.2	0.2	0.0		0.0				0.7	0.2	0.1
Cow milk, whole	0.0		-0.2	-0.1	3.9	-0.1	0.2				-0.3	-0.1	0.0	1.9
Chicken Meat				0.0	0.0	0.0								-0.1
Goat Meat								0.6						0.4
Sheep Meat		0.2	0.0			0.0		0.2						0.4

Note: Based on 2005-2009 FAO Data as of February 24, 2011. Average annual change in yield estimates are the unweighted average of country-level annual changes in yields from 2005-2009. Blanks indicate no data available in this date range. (a) The 2005 harvest in Malawi was historically low, making the annual percentage increase in yield from 2005-2006 for many staples in Malawi as much as 100% or more (hence the high average values for Malawi from 2005-2009).

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Cape Verde	Ken. Afr. Republic	Chad	Comoros	Congo	Côte d'Ivoire	Dem. Rep. of Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
<i>Crops (average % change in yield per year)</i>																
Bananas																
Barley		0.85		-0.30	-0.36	0.41		-0.06	0.00	0.00	0.00					0.73
Beans, dry																
Cashew nuts w/ shell	4.43	0.75		0.25			1.41		-0.40	-1.11	0.00	0.23		-2.59		
Cassava		1.20								4.74						
Chick peas	3.96	3.00		0.04	0.72	-0.36	-7.51	-0.27	-0.69	-1.44	0.00				0.09	
Chillies & peppers, dry																
Cocoa beans		-0.62		-0.14	1.03	-0.05				-0.50	0.17	6.85				
Coffee, green				1.97					1.75	-0.30	0.26					-0.22
Cow peas, dry	3.70			0.99		-6.08				6.75	-0.19		0.78		1.04	-1.35
Groundnuts w/ shell																
Legumes	2.36	-0.50		-8.83		-0.92	-4.02	0.10	0.42	-0.03	0.00			5.35	1.92	3.40
Maize																
Millet	2.92	5.06	0.37	0.83	35.56	-1.48	-3.15	-3.75		2.93		2.78		143.9	0.28	
Oats	9.69	-2.75	-0.21				-0.61		0.00	26.48	0.00			12.32		
Oil palm fruit																
Oilseeds		-1.64		0.04		0.17			0.00	-0.82	-1.03					-0.07
Pigeon peas																
Plantains								0.21			-0.02					
Potatoes				0.70		0.33			0.00	0.24	0.01				0.48	-0.17
Pulses																
Rapeseed		11.99	0.17		-0.09		0.38	0.28		-0.16	-1.78			-2.34	0.20	17.33
Rice, paddy																
Seed cotton	-2.86	1.24		0.06		-6.65	3.35	-0.49	0.03	-3.63					2.50	4.23
Sesame seed	-6.48	9.24		-4.65		5.98	-4.42			-4.98						-2.18
Sorghum		1.64		-0.81		-3.94	0.46				-0.01			6.39		
Soybeans		-0.40	8.69	5.46		3.94	2.46			-0.39	0.00			22.40		
Spices																
Sugar cane								-0.08		0.03						0.49
Sweet potatoes	-0.01	-7.51			0.00	-0.01			-0.69	-0.54	-1.71				0.49	
Vegetables																
Wheat	0.10	-0.20			1.27	0.08	0.47		0.01	0.05		-0.43				-0.22
Yams	3.80		-1.14											587.5		-0.08
<i>Livestock (average change in yield per year)</i>																
Buffalo meat																
Buffalo milk, whole																
Cattle meat	-0.1		-0.7	0.89	0.4	0.1	-0.1				6.6	0.0				
Cow milk, whole	-0.1					0.1	0.0				0.0					
Chicken Meat				6.86		12.0	-0.2				0.9	0.1				
Goat Meat							0.0				2.2	-1.1				
Sheep Meat				1.36							-9.3	0.3				

Note: Based on 2005-2009 FAO Data as of February 24, 2011. Average annual change in yield estimates are the unweighted average of country-level annual changes in yields from 2005-2009. Blanks indicate no data available in this date range.

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Mauritania	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
Crops (average % change in yield per year)															
Bananas	1.01	1.16		-0.21	-14.9				-0.29		-0.34	-0.33	-0.09	-2.90	
Barley															
Beans, dry			217.0			0.00					9.13	-3.94	-0.01		4.65
Cashew nuts w/ shell	-6.47	-1.74			0.72				2.69				0.73		
Cassava	1.17	-8.00		-0.23	3.88			-0.10	0.20			-0.79	3.93	-5.41	-0.30
Chick peas								-0.13				-0.33			
Chillies & peppers, dry					14.69			-0.05	1.51	1.60		-0.01	4.17	1.47	
Cocoa beans	-0.16			0.37						3.88			3.60		
Coffee, green	2.63			-9.35									2.12		0.22
Cow peas, dry															
Groundnuts w/ shell	2.56	-4.22		0.71	-0.61		-3.04	0.89	6.81	0.07	3.77	21.49	2.36	-1.94	18.88
Legumes								0.50							
Maize	6.74	-15.3	-12.1		22.96	2.34	-1.27	2.49	-4.95	-4.58	11.90	19.73	1.38	2.96	-4.16
Millet	0.55	-7.03			4.49	20.56	5.09	3.50	5.73			-4.75	-6.69	4.64	9.23
Oats			0.36								3.97				1.12
Oil palm fruit										0.15			-0.04		
Oilseeds															
Pigeon peas															
Plantains	0.05	-0.27		-0.06						-0.06					
Potatoes															
Pulses	0.60	0.92		0.15	0.33		-0.04	-0.17		-0.07		0.57	10.72	0.57	-0.03
Rapeseed															
Rice, paddy	2.44	4.46		4.96	2.59	2.98		-17.7	7.96	-0.20	0.78	2.36	0.10	8.59	-0.14
Seed cotton	0.41	1.74			-3.28			25.00	-3.88		-3.00	-3.30	6.99	0.28	-1.44
Sesame seed	2.11				15.09			16.02	-5.04			9.42	0.97		
Sorghum	0.08	2.32	11.47		13.19	-0.70	-0.59	3.74	3.17		2.48	7.63	0.06	-4.35	6.93
Soybeans															
Spices								0.11						0.48	
Sugar cane	-0.21	-0.21		-0.02	-1.63			-3.41	-0.14		0.26	1.12			1.05
Sweet potatoes															
Vegetables	1.09	-0.04	-0.89		0.13		-0.22	-0.06	1.84	0.39	-0.81	-15.6	-0.73		0.51
Wheat			-0.58		8.14	1.13	7.67	-0.98			6.83	-4.82		-1.83	-2.81
Yams	-1.60			-0.48	13.38	-0.17						0.04	0.16		
Livestock (average % change in yield per year)															
Buffalo meat															
Buffalo milk, whole															
Cattle meat	4.1						0.2	0.0	5.2		0.7	-0.3			
Cow milk, whole	0.0								0.0		-2.2	0.3			0.0
Chicken Meat	-2.5								2.1		0.0				
Goat Meat	2.7								3.3		-0.2				
Sheep Meat	-0.6	0.0							3.4		0.1	0.0			

Note: Based on 2005-2009 FAO Data as of February 24, 2011. Average annual change in yield estimates are the unweighted average of country-level annual changes in yields from 2005-2009. Blanks indicate no data available in this date range.

Appendix VII. Agriculture Value Added, % GDP

Priority Countries	Nigeria	Uganda	Ethiopia	Tanzania	Kenya	Malawi	Madagascar	Ghana	Mozambique	Burkina Faso	Rwanda	Burundi	Bangladesh	India
<i>Year</i>														
1995		49.4	57.5	47.1	31.1	30.4	26.7	42.7	34.8	35.4	44.0	48.1	26.4	26.5
1996		45.1	56.7	48.0	30.7	34.7	27.2	43.9	35.2	39.0	47.2	57.2	25.7	27.4
1997		42.0	57.6	46.8	30.9	32.6	31.5	40.1	34.9	36.4	46.0	49.2	25.8	26.1
1998		42.1	52.6	44.8	31.2	35.6	30.6	40.2	30.8	39.2	45.5	46.3	25.4	26.0
1999		38.5	49.5	45.1	32.4	37.8	30.0	39.9	28.6	32.6	41.9	43.7	26.2	25.0
2000		29.4	49.9	45.0	32.4	39.5	29.2	39.4	24.0	29.0	37.2	40.4	25.5	23.4
2001		29.7	47.7	44.7	31.3	38.8	27.9	39.3	22.5	36.6	37.3	39.5	24.1	23.2
2002	48.6	24.9	43.5	44.7	29.1	37.7	31.7	39.2	27.8	34.9	35.5	40.5	22.7	20.9
2003	42.7	26.1	41.9	45.0	29.0	37.6	29.2	40.2	28.0	35.6	38.5	40.1	21.8	21.0
2004	34.2	22.9	44.2	46.1	28.0	36.8	28.8	41.5	27.4	32.9	38.8	40.1	21.0	18.9
2005	32.8	26.7	46.7	46.1	27.2	32.9	28.3	40.9	27.0	34.1	38.7	34.8	20.1	18.8
2006	32.0	25.6	47.9	45.3	26.7	34.2	27.5	30.4	27.9	33.3	38.6		19.6	18.1
2007	32.7	23.6	46.2		20.1	34.3	26.2	29.0	27.7		35.6		19.2	18.0
2008		22.7	43.8		21.0	34.3	25.2	31.0	30.5		37.4		19.0	17.2
2009		24.7	50.7		22.6	35.9	23.9	31.7	31.5		38.7		18.7	17.1
<i>Average Annual % Change</i>														
1995-96		-8.6	-1.3	1.9	-1.3	14.1	1.9	2.8	1.2	10.2	7.2	18.9	-2.7	3.3
1996-97		-7.0	1.6	-2.6	0.5	-6.1	16.0	-8.7	-1.1	-6.9	-2.6	-14.0	0.4	-4.6
1997-98		0.2	-8.8	-4.3	1.1	9.2	-3.1	0.5	-11.5	7.8	-1.0	-5.8	-1.3	-0.4
1998-99		-8.6	-5.8	0.7	3.7	6.3	-1.8	-0.8	-7.4	-16.8	-7.9	-5.7	2.9	-3.9
99-2000		-23.6	0.8	-0.1	-0.1	4.5	-2.7	-1.3	-15.9	-11.1	-11.3	-7.5	-2.5	-6.6
2000-01		1.0	-4.4	-0.8	-3.2	-1.9	-4.5	-0.2	-6.3	26.3	0.4	-2.2	-5.6	-0.7
2001-02		-16.1	-8.7	-0.1	-7.0	-2.7	13.6	-0.3	23.6	-4.8	-4.9	2.6	-5.7	-10.0
2002-03	-12.1	5.0	-3.7	0.8	-0.3	-0.5	-7.8	2.6	0.8	2.1	8.3	-1.1	-4.3	0.5
2003-04	-19.9	-12.4	5.5	2.5	-3.4	-2.1	-1.4	3.3	-2.2	-7.7	0.9	0.0	-3.3	-10.0
2004-05	-4.3	16.5	5.7	0.0	-3.0	-10.5	-1.8	-1.5	-1.7	3.9	-0.3	-13.1	-4.3	-0.4
2005-06	-2.3	-4.2	2.6	-1.8	-1.7	3.7	-2.9	-25.7	3.3	-2.5	-0.2		-2.6	-3.7
2006-07	2.2	-7.7	-3.5		-24.8	0.4	-4.8	-4.5	-0.5		-7.7		-1.9	-0.9
2007-08		-3.8	-5.2		4.6	0.0	-3.7	6.6	10.0		5.1		-1.2	-4.3
2008-09		8.6	15.6		7.5	4.7	-5.2	2.3	3.2		3.6		-1.5	-0.4

Other SSA Countries	Angola	Benin	Botswana	Cameroon	Cen. Afr. Republic	Chad	Congo	Cote d'Ivoire	Dem. Rep. Congo	Djibouti	Equatorial Guinea	Eritrea	Gabon	Gambia
<i>Year</i>														
1995	7.3	34.0	4.4	23.6	46.2	35.8	10.5	24.7	57.0	3.2	51.6	20.9	8.0	30.0
1996	7.0	37.7	4.0	23.6	49.7	39.0	9.0	24.6	33.6	3.6	36.5	18.0	7.1	29.8
1997	9.0	37.5	3.7	24.7	51.4	39.9	9.1	23.3	48.1	3.5	23.3	16.9	7.2	29.5
1998	13.0	38.2	3.3	25.3	53.3	40.8	11.0	24.1	47.5	3.5	21.7	25.5	7.0	28.4
1999	6.3	37.8	2.8	24.4	53.9	39.7	8.4	22.0	52.7	3.5	12.8	24.9	7.3	34.1
2000	5.7	36.5	2.7	22.1	53.1	42.3	5.3	24.2	50.0	3.5	9.8	15.1	6.2	35.8
2001	8.2	35.5	2.3	22.2	54.3	41.8	5.8	24.7	59.7	3.5	7.2	17.9	6.4	36.3
2002	7.9	33.8	2.0	22.1	54.3	39.4	6.3	25.7	51.0	3.6	6.4	16.4	6.1	27.6
2003	8.3	32.1	2.5	21.7	59.7	33.6	6.3	25.6	51.0	3.6	5.5	14.7	6.1	31.1
2004	8.6	32.1	2.0	20.5	55.3	23.5	5.5	23.2	47.3	3.6	4.1	13.9	5.6	33.7
2005	7.7	32.2	1.8	19.5	54.4	12.3	4.5	22.8	45.5	3.5	2.6	22.6	4.9	32.1
2006	8.9		1.8	19.9	55.0	11.7	4.0	22.9	45.7	3.5	2.8	24.6	4.9	30.3
2007	8.0		2.1	19.5	53.9	12.5	4.4	23.9	42.5	3.9	2.7	24.3	4.8	28.7
2008	6.6		1.9		52.9	13.6	3.7	25.0	40.2		2.0	14.4	4.1	28.5
2009	10.2		3.1		55.5		4.5	24.4	42.9		3.5	14.4	5.1	27.5
<i>Average Annual % Change</i>														
1995-96	-3.9	10.7	-8.3	-0.2	7.5	8.8	-14.0	-0.5	-41.1	10.4	-29.2	-14.1	-11.7	-0.7
1996-97	28.1	-0.5	-8.2	4.9	3.5	2.4	1.7	-5.2	43.5	-1.1	-36.1	-6.3	1.8	-1.0
1997-98	44.8	1.9	-9.9	2.4	3.7	2.2	19.9	3.4	-1.4	-1.5	-7.0	51.4	-2.7	-3.6
1998-99	-51.7	-0.9	-14.9	-3.8	1.0	-2.6	-23.7	-8.8	11.0	0.2	-40.8	-2.5	3.9	20.1
99-2000	-9.9	-3.5	-4.2	-9.1	-1.3	6.5	-36.5	10.1	-5.2	1.6	-23.5	-39.3	-14.8	4.8
2000-01	44.0	-2.7	-16.3	0.2	2.2	-1.2	9.3	2.0	19.6	-0.2	-26.6	18.6	2.5	1.3
2001-02	-3.7	-5.0	-11.2	-0.2	0.0	-5.7	8.0	3.9	-14.6	1.2	-11.6	-8.4	-4.5	-23.9
2002-03	6.1	-5.0	22.3	-1.8	10.0	-14.8	0.2	-0.4	0.0	0.9	-13.5	-10.4	-0.3	12.6
2003-04	3.6	0.0	-17.3	-5.9	-7.4	-30.1	-12.2	-9.3	-7.3	0.1	-25.8	-5.4	-7.2	8.4
2004-05	-11.3	0.4	-9.7	-4.6	-1.5	-47.7	-17.5	-1.6	-3.7	-2.3	-36.1	62.6	-13.3	-4.6
2005-06	16.3		0.4	1.6	1.1	-5.0	-12.8	0.5	0.3	-0.8	6.1	8.8	1.1	-5.8
2006-07	-9.9		11.8	-2.0	-2.1	7.4	9.9	4.1	-7.0	9.9	-3.3	-1.2	-1.9	-5.1
2007-08	-17.2		-9.7		-1.8	8.9	-15.0	4.7	-5.3		-25.8	-40.7	-16.2	-0.6
2008-09	53.6		66.9		4.9		22.0	-2.4	6.7		74.3	-0.2	24.7	-3.8

Other SSA Countries	Guinea	Guinea-Bissau	Lesotho	Liberia	Mali	Namibia	Niger	Senegal	Sierra Leone	South Africa	Sudan	Togo	Zambia	Zimbabwe
<i>Year</i>														
1995	22.0	62.4	18.1	78.6	46.5	11.0	42.6	19.4	61.8	3.8	46.3	35.0	21.1	21.8
1996	22.5	58.7	18.5	76.2	46.5	11.4	40.7	19.0	62.0	3.5	45.2	36.9	24.2	19.4
1997	20.3	56.4	12.3	72.0	41.6	11.8	37.8	19.1	58.4	3.3	41.7	34.2	22.3	18.5
1998	22.0	51.4	13.2	73.3	37.8	10.5	40.0	18.5	47.1	3.5	42.8	37.7	22.1	17.4
1999	22.5	57.3	10.3	75.5	35.0	10.9	39.6	15.5	47.8	4.2	42.1	38.1	22.1	14.1
2000	22.3		10.2	71.6	38.8	10.9	40.0	17.6	46.7	3.4	38.8	40.8	22.6	16.8
2001	25.1		10.1	68.2	36.4	9.7		15.9	44.9	3.1	35.2	41.2	23.0	16.7
2002	24.2		8.6	65.8	36.6	11.3		16.7	51.6	2.7	32.0	43.7	22.1	19.1
2003	23.8		9.8	56.9	36.9	10.5		14.8	51.1	2.9	30.1		20.9	
2004	25.3		8.2	55.0	36.5	9.4		13.4	49.9	3.4	28.1		21.6	
2005	24.9		7.8	61.3		9.3		15.5	50.2	3.2	26.2		21.2	
2006	17.2		8.4			9.4		16.6	51.4	3.0	29.7		20.8	
2007	22.0	62.4	18.1	78.6	46.5	11.0	42.6	19.4	61.8	3.8	46.3	35.0	21.1	21.8
2008	22.5	58.7	18.5	76.2	46.5	11.4	40.7	19.0	62.0	3.5	45.2	36.9	24.2	19.4
2009	20.3	56.4	12.3	72.0	41.6	11.8	37.8	19.1	58.4	3.3	41.7	34.2	22.3	18.5
<i>Average Annual % Change</i>														
1995-96	-7.6	4.6	0.2	14.9	4.7	-1.5	-3.1	-5.2	10.7	8.7	13.2	8.1	-4.5	42.9
1996-97	17.8	-5.2	-5.7	-18.1	-14.2	-8.7	-0.2	-0.8	23.6	-4.4	6.9	3.3	6.2	-13.0
1997-98	4.9	14.2	0.5	2.2	4.4	0.7	9.7	-2.0	5.4	-6.0	-1.0	-17.1	13.3	15.1
1998-99	2.4	-5.9	2.3	-3.1	0.1	3.6	-4.4	-2.0	0.3	-6.0	-2.4	5.6	14.4	-10.9
99-2000	-9.9	-3.8	-33.3	-5.5	-10.6	4.0	-7.1	0.9	-5.8	-7.6	-7.8	-7.4	-7.7	-4.8
2000-01	8.7	-8.9	6.9	1.8	-9.1	-11.1	5.7	-3.3	-19.3	7.2	2.7	10.3	-0.9	-6.2
2001-02	2.1	11.4	-21.6	3.0	-7.3	4.1	-1.1	-16.1	1.6	18.2	-1.7	1.1	-0.2	-18.5
2002-03	-0.9		-1.1	-5.1	10.7	0.0	1.1	13.0	-2.3	-17.3	-7.9	6.9	2.3	18.8
2003-04	12.4		-1.6	-4.8	-6.2	-11.0		-9.6	-3.9	-9.4	-9.1	1.0	2.0	-0.3
2004-05	-3.6		-14.4	-3.4	0.6	16.3		5.2	14.8	-14.1	-9.2	6.0	-4.1	14.2
2005-06	-1.3		13.8	-13.5	0.9	-7.6		-11.4	-0.9	8.0	-6.0		-5.2	
2006-07	6.3		-16.4	-3.4	-1.0	-10.6		-9.4	-2.4	16.7	-6.4		3.2	
2007-08	-1.7		-4.5	11.5		-0.3		15.9	0.7	-5.3	-6.7		-1.9	
2008-09	-31.1		7.3			0.2		6.8	2.3	-5.1	13.1		-1.8	

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