**DEVELOPMENTAL REGIMES IN AFRICA**
**WORKING PAPER**
**PRELIMINARY VERSION FOR:**

# AFRICAN AGRICULTURE – THE POTENTIAL AND THE PROSPECTS: CASE STUDIES FOR KENYA AND TANZANIA, EXPLORING A METHOD OF ANALYSIS.

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DEVELOPMENTAL REGIMES IN AFRICA: ORIGINS, POLICIES AND SUSTAINABILITY.

**TON DIETZ AND WIJNAND KLAVER**
AFRICAN STUDIES CENTRE LEIDEN

Comments/additions: **dietzaj@ascleiden.nl**

# Introduction: the Tracking Development legacy

Between 2008 and 2013 two Leiden-based research centres did a comparative study about development performance between Southeast Asia and Sub-Sahara Africa. Four pairs of countries have been compared: Malaysia with Kenya, Vietnam with Tanzania, Indonesia with Nigeria and Cambodia with Uganda. These two research centres were the African Studies Centre and the KITLV. Funds have been provided by the Netherlands Ministry of Foreign Affairs. The major results can be found in a booklet ("the richer harvest") made by a science journalist (Dirk Vlasblom): see https://openaccess.leidenuniv.nl/handle/1887/20579. Two final scientific publications will appear in 2013, while two PhD candidates defended their theses in 2012 and two in 2013[1].

There are three core findings, explaining the divergence of Southeast Asia´s and S.S.Africa´s development trajectories: a successful development policy, in other words a policy that results in economic growth and poverty alleviation needs (1) adequate macro-economic management; (2) pro-poor, pro-rural public spending and (3) economic freedom for peasant farmers and small entrepreneurs. In order to do that there appeared to be three implementation principles underlying both these policy decisions and the successful implementation of that policy in Southeast Asia: (1) outreach; (2) urgency and (3) expediency.

In collaboration with the APPP project of David Booth and others, some Tracking Development researchers work together in the 'Developmental Regimes in Africa' project. Recently Africa's economy seems to be booming, and many observers speculate about an era of African lions or cheetahs, after the era of Asian tigers. Many would see a major turning point around 2000, when many African economies started to show economic growth figures much above their demographic growth figures. It is an intriguing question if the African regimes have changed into 'developmental regimes' and if they indeed have taken the 'Asian lessons' at heart. This would mean that they indeed apply the 'golden policy rules' as detected by the Tracking Development findings. And it is important then to zoom in on agricultural performance.

The 'Developmental Regimes in Africa' project is in its early stages. In this paper we do not look at policies as such yet. We look at the statistical evidence of agricultural breakthroughs. And we ask ourselves four major questions.

1) If we compare demographic and agricultural growth figures what do these tell us about the ability of countries to feed their populations with their own produce?

[1] Fuady, Ahmad Helmi (2012) Elites and economic policies in Indonesia and Nigeria, 1966/1998. Amsterdam:PhD Thesis
Leang Un (2012) A comparative study of education and development in Cambodia and Uganda from their civil wars to the present. Amsterdam: PhD Thesis.
Kilama, Blandina (2013) The diverging South. Comparing the cashew sectors of Tanzania and Vietnam. Leiden PhD Thesis. Also African Studies Centre Collection 48; https://openaccess.leidenuniv.nl/handle/1887/20600.
Kinuthia, Bethuel (2013) Reversed fortunes in the south. A comparion of the role of FDI in industrial development in Kenya and Malaysia. Leiden: PhD Thesis. Also African Studies Centre Collection 47.

2) If we look at the total food balance sheets, what are the major trends in food security
3) If we look at statistics for crop production and livestock numbers which crops and livestock have performed successfully?
4) When were the major turning points for these successes.

We define 'agricultural success' with growth that was faster than demographic growth, and we compare 2011 with 1961 and with 2000.

We assume that 'successful' crops and livestock are an indication of 'pockets of effectiveness', or 'pockets of promise', and the next question, to be answered in the remaining part of the DRA project would be: was this success a result of helpful government policies, or was it despite government behaviour. It is our hypothesis that government policies have been important, but mainly in providing farmers and traders with a conducive environment to profit from structural changes in Africa's demographic and socio-economic set up: rapidly expanding cities, with expanding middle classes, that provide a fast growing market for home-produced crops and livestock products.

Here we present the first results of an analysis of the agricultural statistics of two East African countries that have been studied as part of the TD project: Kenya, and Tanzania. We base ourselves on statistics as compiled by the FAO and online accessible in the FAOSTAT database: www.faostat.org. We use the production statistics and the food balance sheets for the years 1961-2011. But first we present the overall picture for Africa, giving information about its overall population growth and the development of food energy per capita, based on cereals, pulses and roots and tubers produced in Africa itself.

*Table I-1 Africa's population 1961-2009*

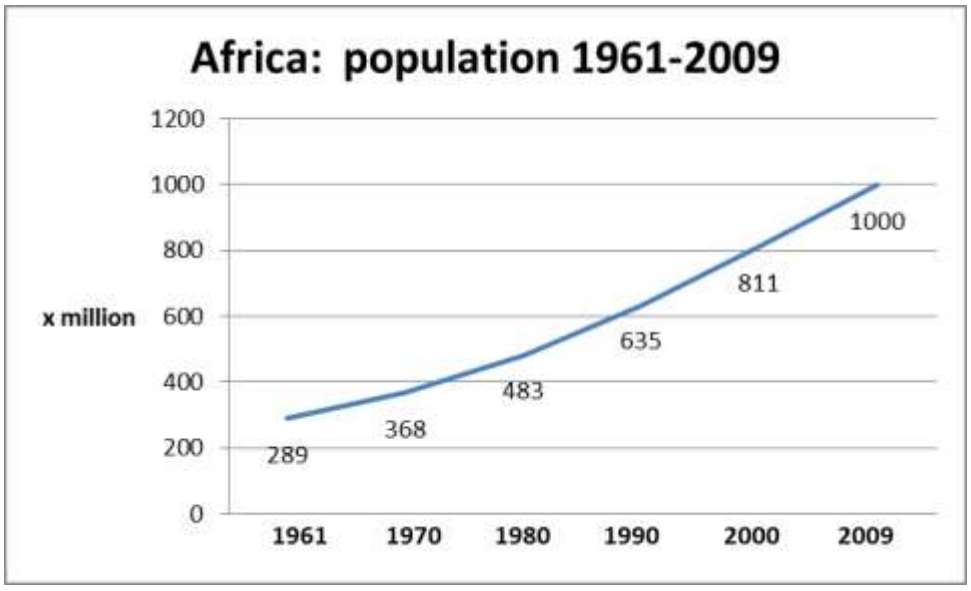
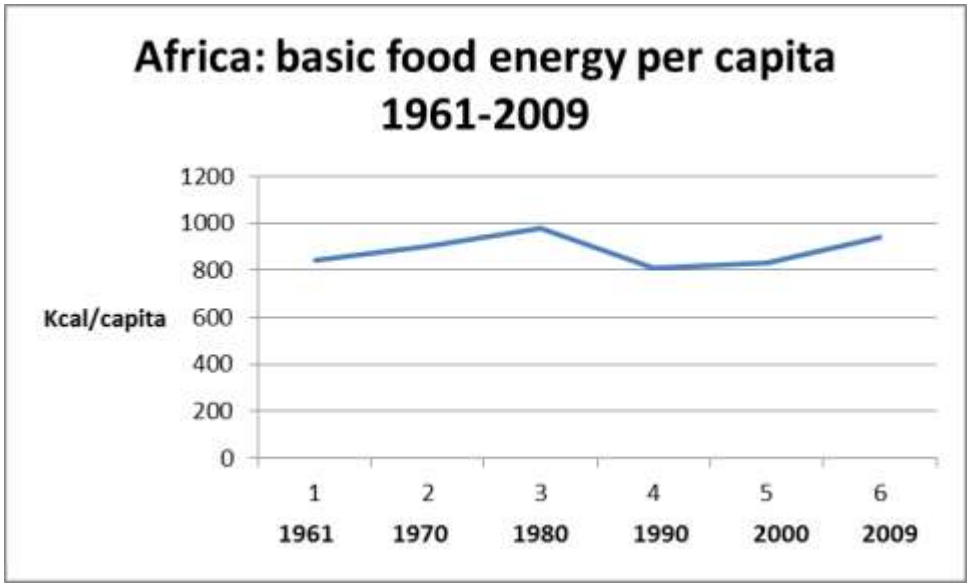



*Figure I-2 Africa's basic food availability 1961-2009*




For Africa as a whole it is clear that population growth has been very high throughout the last fifty years (Table I-1) and that basic food production per capita improved between 1961 and 1980 and, on average, was above minimum requirements as suggested by the WHO (825,000 Cal/capita). Between 1980 and 1990 the situation deteriorated and Africa as a whole fell below the minimum requirements. There was a slight improvement between 1990 and 2000 and a major recovery after 2000, almost reaching the highest level recorded during the last fifty years (Table I-2). We will see that Tanzania and Kenya present two contrasting cases within Africa.

# Kenya

## 1. Analysis of production data

Kenya has had an extremely high population growth over the last fifty years, experiencing an almost five-fold increase in its population. In 1961 it could feed its 8.4 million people at the level of WHO requirements (825,000Cal/capita/year). In the 1960s, basic food crop production improved both in terms of area harvested and in terms of yield (slightly) and, as a result, its population reached a food-sufficiency level based on local production that was 4% higher than WHO requirements. After 1970, the situation began to deteriorate. Areas expanded somewhat in the 1970s but yields dropped, partly due to severe droughts. During the 1980s the harvested area of cereals, roots and tubers stabilized and that of pulses more than doubled, and yields recovered. In the 1990s yield levels deteriorated for all basic food crops and the harvested area of pulses declined again. The last decade has however shown impressive improvements: harvested areas for the most important basic food crops (mainly maize) reached an all-time high (2.7 m ha) while average cereal yield levels improved from 1370 kg/ha in 2000 to1514 kg/ha in 2011. Kenya produced 4.1 million tons of cereals in 2011. Its total basic food production could have potentially fed 64% of its population that year, up from 50% in 2000. Between 2000 and 2011 a lot happened, though. Between 2000 and 2006 figures show a steady improvement. However, at the end of 2007, the political situation went disastrously wrong and many farmers had to seek refuge in camps or with relatives elsewhere and to abandon their fields. Statistics show that the harvested cereal area in 2007 went down 15% (although average yields improved in those areas where cereals could be harvested, up to 1770 kg/ha). In 2008 there was a further reduction in the area under cultivation but yields fell back to only 1420 kg/ha and in 2009 they even hit average levels below those of 1961. For pulses and roots and tubers, the situation was not much better.

Although the harvested area improved, but not yet to 2006 levels, Kenya's basic food production in 2009 reached alarmingly low levels and the country could only potentially feed 48% of its population of 39 million at WHO food requirement levels. The 2007/2008 troubles can thus be seen to have resulted in at least a 30% loss in basic food production levels by 2009. In 2010 and 2011 the situation recovered somewhat, despite a serious drought in 2011 in the dry eastern parts of the country (see Table K.1).

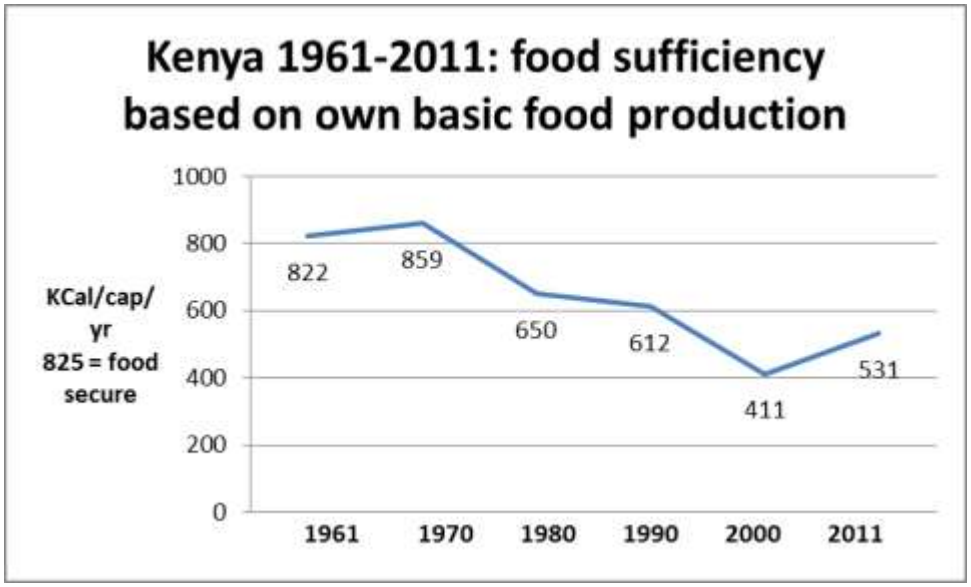
*Table K.1: Population and food production dynamics in Kenya: harvested area (x 1000 ha) 1961-2011.*

| | 1961 | 1970 | 1980 | 1990 | 2000 | 2011 | 2011/1961 index |
|---|---|---|---|---|---|---|---|
| *Population (millions)* | | | | | | | |
| | 8.4 | 11.3 | 16.3 | 23.4 | 31.3 | 41.6 | 495 |
| *Cropping area (x m. ha of harvested crops)* | | | | | | | |
| Cereals | 1.1 | 1.6 | 1.8 | 1.8 | 1.9 | 2.7 | 245 |
| Pulses | 0.6 | 0.7 | 0.7 | 1.5 | 1.2 | 1.5 | 250 |
| Roots/tubers | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 231 |
| *Yield (1000 kg/ha)* | | | | | | | |
| Cereals | 1.2 | 1.3 | 1.2 | 1.6 | 1.4 | 1.5 | 125 |
| Pulses | 0.4 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 107 |
| Roots/tubers | 7.0 | 7.7 | 7.4 | 9.7 | 7.1 | 15.4 | 220 |
| *Total basic food production (million tons)* | | | | | | | |
| Cereals | 1.4 | 2.1 | 2.2 | 2.8 | 2.6 | 4.1 | 293 |
| Pulses | 0.3 | 0.3 | 0.4 | 0.8 | 0.5 | 0.8 | 267 |
| Roots/tubers | 0.8 | 1.0 | 1.2 | 1.6 | 1.6 | 3.8 | 475 |
| *Food energy value (x 1000 Cal/capita/year)* | | | | | | | |
| Cereals | 600 | 669 | 486 | 431 | 299 | 355 | 59 |
| Pulses | 89 | 66 | 61 | 85 | 40 | 48 | 54 |
| Roots/tubers | 133 | 124 | 103 | 96 | 72 | 128 | 96 |
| *Total* | 822 | 859 | 650 | 612 | 411 | 531 | 65 |

*Food energy calculations based on cereals = 3600Cal/kg; pulses = 2500 Cal/kg and roots and tubers = 1400 Cal/kg. Roots and tubers in Kenya are mainly potatoes, sweet potatoes and cassava. Plantains/bananas add additional calories (in 1961 and in 2009 21 and 28 KCal/cap/yr) to the basic diet.*
*FAO data for 2011 are provisional.*

Figure K1 shows the food security assessment for Kenya between 1961 and 2011, based on calculations as presented in table K1.

*Figure K.1*




Figures K2 and K3 show the trends based on three-year averages, and based on ALL food crops, which present a more complete, and less dramatic picture. Table K3 shows area dynamics for all Kenya's crops.

*Figure K2Kenya*

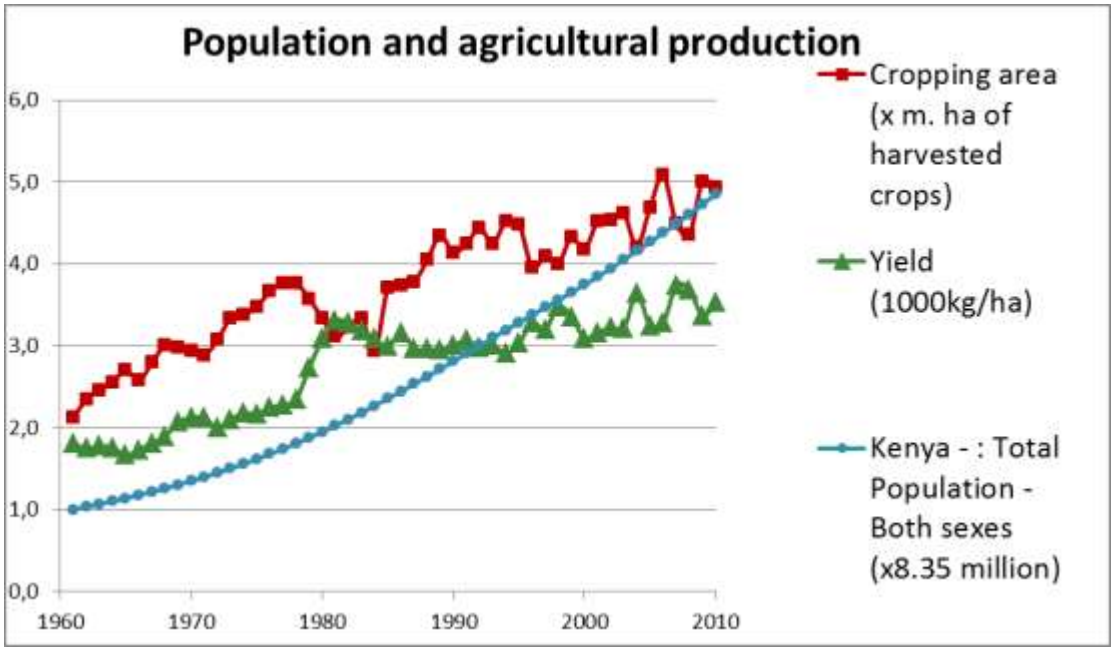



*Figure K3 Kenya*

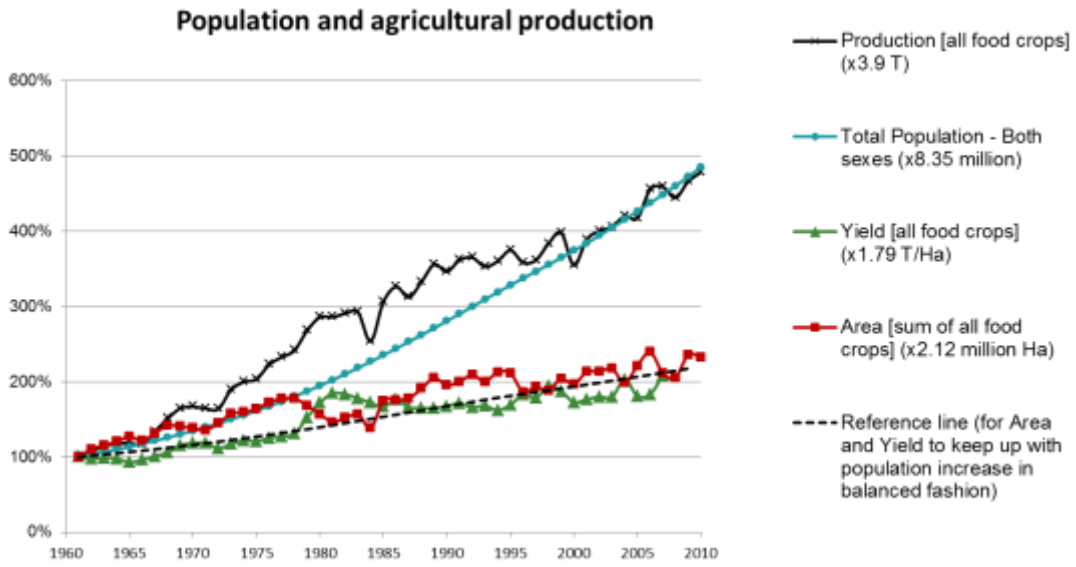



*Table K.2: Kenya's crops: harvested area (x 1000 ha), 1961-2011*

| Crop | 1961 | 2011 | 2011/1961 index |
|---|---|---|---|
| Cereals | 1,106 | 2,680 | 242 |
| Pulses | 645 | 1,512 | 234 |
| Roots/tubers | 108 | 249 | 231 |
| Fibres | 114 | 61 | 54 |
| Oil crops | 72 | 254 | 353 |
| Fruits | 54 | 197 | 365 |
| Tree nuts | 11 | 35 | 318 |
| Vegetables | 44 | 162 | 368 |
| Coffee | 42 | 160 | 381 |
| Sugarcane | 18 | 64 | 356 |
| Tea | 18 | 188 | 1,044 |
| Tobacco | 0 | 23 | > |
| Pyrethrum | 30 | 5 | 17 |
| *Total* | 2,262 | 5,590 | 247 |
| *Basic food/ Total* | 82% | 79% | |

Kenya cannot afford its current low levels of food sufficiency for its basic food crops. However, Kenya's attempts to develop non-food crops were partly successful: its non-basic food area went up from 18% of its total crop area in 1961 to 21% in 2011 (see Table K.2). Of course, Kenya's tea production has been a textbook success story, as has the expansion of its various oil crops (seed cotton, oil palm, coconut). And the increases in production in sugarcane, fruits and vegetables (partly for the export market) can also be seen as major successes. But these cannot compensate for the lack of basic food security and the last few decades have been quite alarming for Kenya's food-security situation. Kenya's local food production went from 822,000 Cal/cap/yr in 1961 to 401,000 Cal/cap/yr in 2009 [and in 2011 some recovery: to 531,000 Cal/cap/yr]. In the meantime, Kenya's total agricultural land increased from 4% of its 569,140 km² to 9%, but most of the remaining land is arid or semi-arid and regarded as too risky for agriculture.

Livestock

Kenya's livestock population mirrors its rather dismal basic food crop performance over the last fifty years. Its total livestock and TLU population decreased per capita to half its 1961 levels (see Table K.3). Over the last fifty years, only the 1980s showed promising livestock development, with growth figures close to population growth. However, the 1990s saw a dramatic decline in numbers (except for pigs and chickens), with some recovery after 2000, but leading to total tropical livestock numbers still below their 1990 levels in 2011. As a livestock country – and one with the highest livestock numbers per capita in Africa in the 1960s – Kenya's livestock dynamics show a country in distress, but with some promise of recovery after 2000. See Table K.3.

*Table K.3: Kenya's livestock (x million), 1961-2011.*

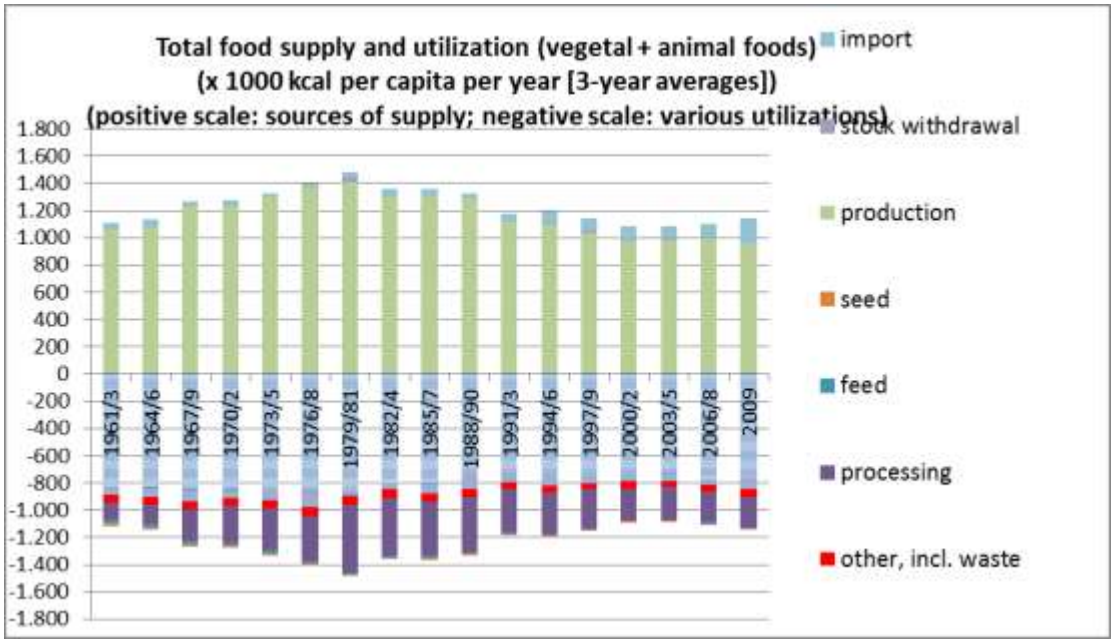
| Year | 1961 | 1970 | 1980 | 1990 | 2000 | 2011 | 2011/1961 index |
|---|---|---|---|---|---|---|---|
| Cattle | 7.2 | 8.6 | 10.0 | 13.7 | 11.7 | 18.0 | 250 |
| Sheep | 4.3 | 3.9 | 5.0 | 9.1 | 7.9 | 10.0 | 233 |
| Goats | 4.7 | 4.2 | 8.0 | 10.2 | 9.9 | 13.4 | 285 |
| Camels | 0.4 | 0.5 | 0.6 | 0.9 | 0.8 | 1.4 | 350 |
| Pigs | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 | 0.4 | 400 |
| *Total* | 16.6 | 17.4 | 23.7 | 34.0 | 30.7 | 43.2 | 260 |
| Chickens | 8.0 | 12.0 | 16.0 | 25.0 | 26.0 | 30.0 | 375 |
| *Total TLU* | 6.4 | 7.5 | 9.1 | 12.7 | 11.1 | 16.7 | 261 |
| *TLU/capita* | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 | 0.4 | 52 |

TLU: cattle x 0.7; goats, sheep and pigs x 0.1; camels x 1.0 and chickens x 0.01.

## 2 Kenya: food balance

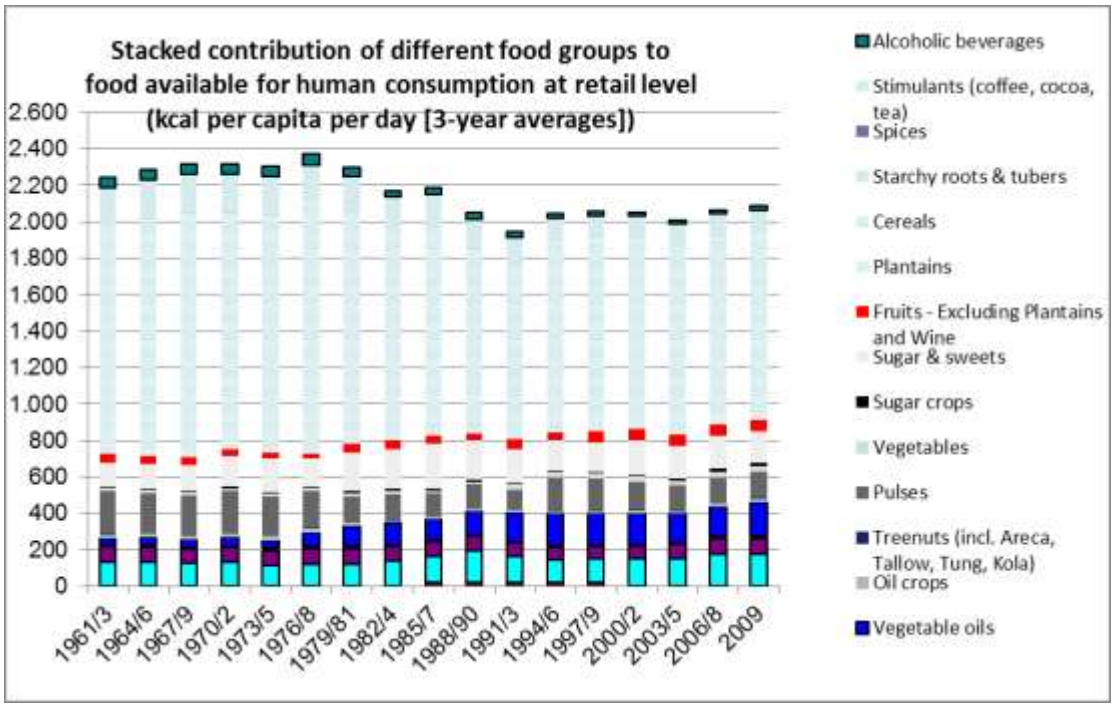
Food availability does not only depend on basic food production. It depends on all food that is being produced, plus imports from abroad, plus stock withdrawal, but minus food that is exported, wasted, used as seed and as livestock feed. This gives the so-called food balance sheets, as presented by the FAO. These are presented as food energy per capita. Overall, they show the same picture as we saw before: improvements until about 1980, deterioration until 2000 and recovery afterwards. Figures K4-K7 give the findings.

*Figure K4 Kenya food balance sheets 1961-2009*



Extra legend: purple = export

*Figure K5 Kenya, Food composition based on all sources of food (food balance) 1961-2009*



(extra legend: purple = meat; light purple = fish; light blue = milk)

*Figure K6 Kenya*

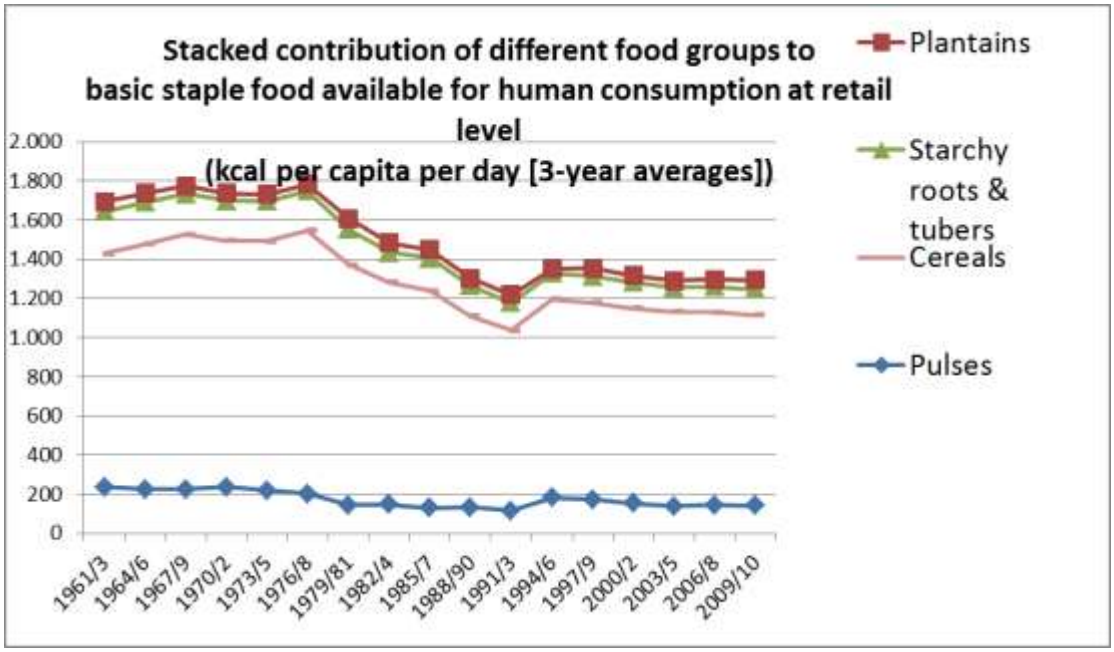
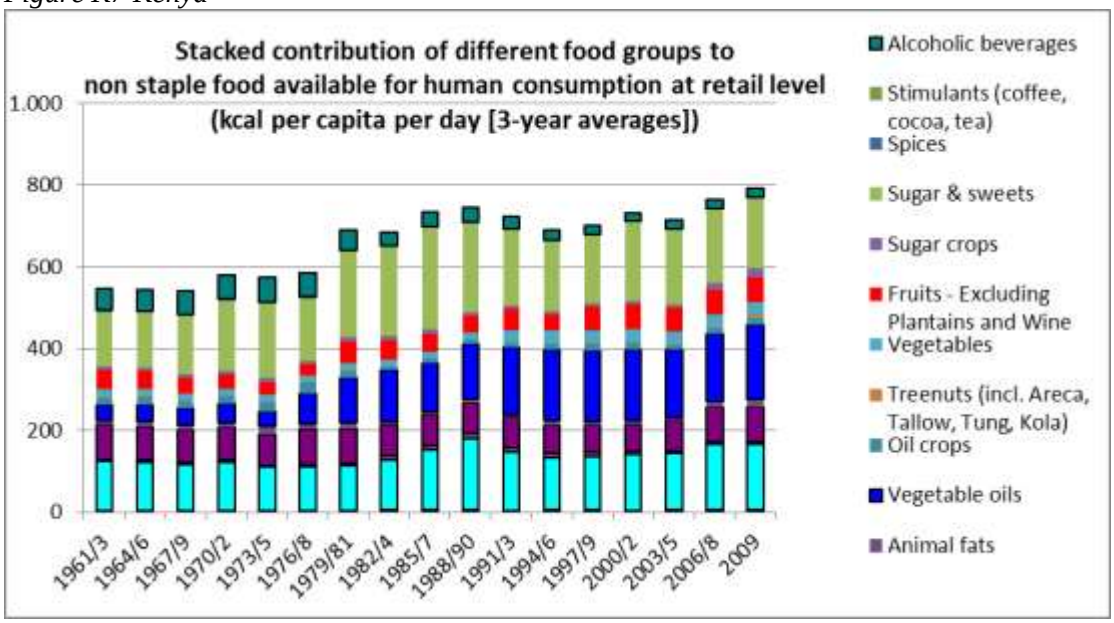



*Figure K7 Kenya*




(extra legend: purple = meat; light purple = fish; light blue = milk)

The overall picture for Kenya is that there was a spurt in area expansion in 1960-1970s and again in the early 1990s; and there was spurt in yield in the early 1980s. Total food production kept more than pace with population growth till 1983, since then there was deterioration; after 2000 some recovery. Food imports increased since the mid-1990s. Dietary energy available for human consumption decreased since the late 1970's although there was some stabilization since the mid 1990's. The decrease in staple foods was partly compensated by an increase in so-called quality foods. This points at gradually better economic conditions, and growing 'middle-class' consumption patterns, probably mainly in the growing cities. These cities function as magnets for production of agricultural products in their hinterlands, and particularly for fruits, vegetables, milk and other ´quality foods´. Let us see which were the main

´pockets of promise´ in Kenya´s agricultural production history of the last half Century, and the last decade.

## 3 Kenya: pockets of promise

If we take the faostat data for crop production and for livestock numbers (1961-2011) we can detect types of crops and livestock species of which total production grew faster than population growth. We restrict ourselves to crops with (in 2011) more than 50,000 ha of harvested area, and to the main livestock species.

We define the first category of ´successful crops and livestock´ as those with growth percentages that are higher than average population growth between 1961 and 2011, and at the same time higher than population growth between 2000 and 2011. A second category are recent additions, crops which did not yet appear in the FAO statistics in 1961 and which have become important later, with 2000-2011 growth figures beyond population growth figures. A third category concerns crops and livestock with high growth figures after 2000, but not for the period 1961-2011 as a whole. A fourth category concerns crops or livestock with a high growth for the period 1961-2011 as a whole, but slower growth, or even decline between 2000 and 2011. Kenya's population growth between 1961 and 2011 was almost 500%, and between 2000 and 2011 more than 133%.

So:
**Category 1**: high growth 1961-2011 (>5.0x) AND high growth 2000-2011 (>1.33x) and (for crops)>50,000 ha;
**Category 2**: not yet in 1961; 2000-2011 high growth (>1.33x) and (for crops)>50,000 ha;
**Category 3**: high growth between 2000 and 2011, but lower than population growth figures for the 1961-2011 period and (for crops)>50,000 ha;
**Category 4**: high growth 1961-2011, but slower growth 2000-2011 and (for crops) >50,000 ha.
Details are given in table K4.

*Table K4 most successful Kenyan crops and livestock*

| Crop/ livestock | KHa/ Numbers in 2011 | Production growth | | Yield growth | | Area growth | |
|---|---|---|---|---|---|---|---|
| | | 2011/ 1961 | 2011/ 2000 | 2011/ 1961 | 2011/ 2000 | 2011/ 1961 | 2011/ 2000 |
| **Category 1** | | | | | | | |
| Dry beans | 1,037 | 10.5 | 1.7 | 1.2 | 1.29 | **9.0** | **1.35** |
| Tea | 188 | 29.9 | 1.6 | 2.8 | 1.0 | **10.4** | **1.6** |
| Potatoes | 123 | 12.2 | 3.5 | 2.7 | **3.1** | **4.6** | 1.1 |
| Sugarcane | 64 | 10.2 | 1.35 | 2.8 | **1.2** | **3.6** | 1.1 |
| Sw.potatoes | 62 | 5.4 | 1.4 | 2.2 | **1.4** | **2.5** | 1.0 |
| Mangoes+ | 59 | 1,591.5 | 5.7 | 4.0 | 1.4 | **295.0** | **3.9** |
| **Category 2** | | | | | | | |
| Cow peas | 198 | - | 2.1 | - | 1.1 | - | 2.0 |
| **Category 3** | | | | | | | |
| Maize | 2,132 | 3.6 | 1.6 | 1.3 | 1.1 | **2.8** | **1.4** |
| Cassava | 60 | 1.6 | 1.6 | **1.5** | **1.6** | 1.1 | 1.0 |
| Coconuts | 51 | 1.3 | 1.4 | 0.5 | 0.5 | **3.0** | **3.2** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Millets | 111 | 0.6 | 1.6 | 0.4 | **1.4** | **1.5** | 1.2 |
| Pulses oth. | 135 | 0.1 | 1.4 | **0.4** | 0.5 | 0.3 | **2.5** |
| Sorghum | 254 | 1.0 | 2.0 | 0.6 | 0.9 | **1.7** | **2.1** |
| Camels | 1.4m | 3.9 | 1.6 | | | | |
| Cattle | 18.0m | 2.5 | 1.5 | | | | |
| Goats | 13.4m | 2.9 | 1.35 | | | | |
| **Category 4** | | | | | | | |
| Oilseeds | 354 | 40.5 | 1.0 | 0.9 | 0.9 | **45.5** | **1.1** |
| Pigs | 0.4m | 6.0 | 0.8 | | | | |

**4. Periods of successful breakthroughs in the pockets of promise**

Tables K5 and K6 present two ways of reporting about the periodization of success. These fourteen successful crops and four different successful species of livestock in 2011 represent 82% of all crop land in Kenya and 77% of its livestock (except chickens). Only one crop (mangoes and guavas) showed a growth consistently higher than population growth for all decades between 1961 and 2011. For mangoes the peak growth was in the 1970s. Three crops experienced high growth figures in four out of five decades: dry beans (peak growth in the 1970s), tea (peak growth in the 1960s), sweet potatoes (peak growth in the 1990s). Two crops (sugarcane and oilseeds) experienced high growth rates in three out of five decades. Sugarcane had its highest growth peak in the 1960s, oil seeds in the 1980s and camels in the 2000s. Three crops and three types of animals only experienced high growth in two out of five decades: maize (with peak growth in both the decades of the 1960s and in the most recent decade), coconuts (with peak growth in the 1990s) and potatoes (with peak growth in the 2000s). Other pulses, as well as goats and camels grew fast in two out of five decades (peak growth in the 1970s or the 1980s; resp. 2000s) and pigs as well (peak growth in the 1990s, but a decline in the most recent decade). Finally cassava, millets and sorghum, and cattle experienced one decade of high growth, the most recent decade.

If we look at the decades then the 1990s was the worst one and the 2000s by far the best one in high crop and livestock growth performance, with the most recent decade high growth in thirteen of the fifteen categories and in five instances also the highest-ever performance. However, the picture is quite nuanced if we look at all decades together in a comparative perspective. Each decade has some breakthrough crops (there is no 'lost decade' in Kenya's agriculture, although the 1990s look pretty gloomy), but with a slightly better performance before 1980 and a far better performance after 2000. The 1980s and 1990s were not very successful.

*Table K5 Most successful crops and livestock: success periods; in figures*

*In italics: figures higher than population growth for the decade*

**In bold: the decade with the highest growth**

| **Crops/ Livestock** | **1961-1970** | **1970-1980** | **1980-1990** | **1990-2000** | **2000-2011** |
|---|---|---|---|---|---|
| *Population* | *1.35* | *1.45* | *1.44* | *1.33* | *1.33* |
| **Category 1** | | | | | |
| Dry beans | *1.45* | ***2.88*** | *1.83* | 0.79 | *1.74* |
| Tea | ***3.25*** | *2.19* | *2.19* | 1.20 | *1.60* |
| Potatoes | 1.12 | 0.90 | *3.98* | 0.86 | ***3.53*** |
| Sugarcane | ***3.30*** | *2.62* | 1.05 | 0.83 | *1.35* |

| | | | | | |
|---|---|---|---|---|---|
| Sw. potatoes | *1.64* | *1.52* | 0.69 | ***2.18*** | *1.44* |
| Mangoes+ | *5.00* | ***6.50*** | *5.77* | *1.50* | *5.65* |
| **Category 2** | | | | | |
| Cow peas | - | - | - | 0.64 | ***2.13*** |
| **Category 3** | | | | | |
| Maize | ***1.56*** | 1.10 | 1.41 | 0.94 | ***1.56*** |
| Cassava | 1.21 | 1.25 | 0.91 | **0.72** | ***1.62*** |
| Coconuts | 1.23 | 0.88 | 0.60 | ***1.51*** | *1.39* |
| Millets | 1.00 | 0.70 | 0.70 | 0.70 | ***1.60*** |
| Sorghum | 1.30 | 0.90 | 0.50 | 0.80 | ***1.96*** |
| Pulses other | 1.20 | 0.50 | ***1.70*** | 0.10 | *1.36* |
| Camels | *1.41* | 1.23 | 1.40 | 0.97 | ***1.64*** |
| Cattle | 1.19 | 1.16 | 1.38 | 0.85 | ***1.54*** |
| Goats | 0.90 | ***1.89*** | 1.27 | 0.97 | *1.35* |
| **Category 4** | | | | | |
| Oilseeds | 1.25 | *3.00* | ***6.00*** | *1.78* | 1.01 |
| Pigs | 0.99 | 1.29 | *1.73* | ***3.27*** | 0.83 |
| *Successes nr* | 7 | 7 | 7 | 4 | **16** |
| *Highest growth nr* | 3 | 3 | 2 | 2 | **8** |
| *Decline* | 2 | 5 | 4 | 12 | **1** |

*Table K6 Most successful crops and livestock: success periods; in colours*

In yellow: figures higher than population growth for the decade

In green: also the decade with the highest growth

In red: decline.

| **Crops/ Livestock** | **1961-1970** | **1970-1980** | **1980-1990** | **1990-2000** | **2000-2011** |
|---|---|---|---|---|---|
| *Population* | *1.35* | *1.45* | *1.44* | *1.33* | *1.33* |
| Dry beans >> | *1.45* | ***2.88*** | *1.83* | 0.79 | *1.74* |
| Tea >> | ***3.25*** | *2.19* | *2.19* | 1.20 | *1.60* |
| Potatoes >> | 1.12 | 0.90 | *3.98* | 0.86 | ***3.53*** |
| Sugarcane >> | ***3.30*** | *2.62* | 1.05 | 0.83 | *1.35* |
| Sw. potatoes >> | *1.64* | *1.52* | 0.69 | ***2.18*** | *1.44* |
| Mangoes+ >> | *5.00* | ***6.50*** | *5.77* | *1.50* | *5.65* |
| Cow peas x> | - | - | - | 0.64 | ***2.13*** |
| Maize <> | ***1.56*** | 1.10 | 1.41 | 0.94 | ***1.56*** |
| Cassava<> | 1.21 | 1.25 | 0.91 | 0.72 | ***1.62*** |
| Coconuts <> | 1.23 | 0.88 | 0.60 | ***1.51*** | *1.39* |
| Millets <> | 1.00 | 0.70 | 0.70 | 0.70 | ***1.60*** |
| Sorghum <> | 1.30 | 0.90 | 0.50 | 0.80 | ***1.96*** |
| Pulses other <> | 1.20 | 0.50 | ***1.70*** | 0.10 | *1.36* |
| Camels <> | *1.41* | 1.23 | 1.40 | 0.97 | ***1.64*** |
| Cattle <> | 1.19 | 1.16 | 1.38 | 0.85 | ***1.54*** |
| Goats<> | 0.90 | ***1.89*** | 1.27 | 0.97 | *1.35* |

| | | | | | |
|---|---|---|---|---|---|
| Oilseeds >< | 1.25 | *3.00* | ***6.00*** | *1.78* | 1.01 |
| Pigs >< | 0.99 | 1.29 | *1.73* | ***3.27*** | 0.83 |
| *Successes nr* | 7 | 7 | 7 | 4 | **16** |
| *Highest growth nr* | 3 | 3 | 2 | 2 | **8** |
| *Decline* | 2 | 5 | 4 | 12 | **1** |

**5. The down side: crops and livestock that failed to grow adequately**

Categories 1-4 given above show crops of which the production grew faster than population growth in 1961-2011 or in 2000-2011 or in both periods. In this last section we will look at crops and livestock with production growth lower than population growth.

In theory there are four categories:
**Category 5:** both in 1961-2011 and in 2000-2011 production growth lower than population growth, but positive.\
**Category 6**: in 1961-2011 negative growth, but in 2000-2011 positive growth, but lower than population growth.
**Category 7**: in 1961-2011 positive growth but lower than population growth, but in 2000-2011 negative growth
**Category 8**: both in 1961-2011 and in 2000-2011 negative growth.

| **Crops/ Livestock** | **1961-1970** | **1970-1980** | **1980-1990** | **1990-2000** | **2000-2011** |
|---|---|---|---|---|---|
| **Category 5** | | | | | |
| Bananas | 1.0 | *2.0* | 1.1 | 1.2 | 1.2 |
| Fresh vegetab. | 1.2 | *1.5* | 1.4 | 1.0 | 1.0 |
| Wheat | *2.0* | 1.0 | 1.2 | 0.8 | 1.3 |
| Chickens | 1.5 | 1.6 | 1.5 | 1.0 | 1.1 |
| Sheep | 0.9 | 1.3 | 1.8 | 0.9 | 1.3 |
| **Category 7** | | | | | |
| Coffee | 2.1 | 1.6 | 1.1 | 1.0 | 0.4 |

In KHa in 2011: bananas: 63; fresh vegetables: 74; wheat: 132; coffee: 160.

# Tanzania

Tanzania's food production performance has been fairly good overall. Tanzania's population has more than quadrupled over the last fifty years, which is not as dramatic a rise as seen in Kenya, but quite close. At independence, Tanganyika and Zanzibar (which were still separate political territories) could not feed their populations at the level of WHO food requirements with the basic food they produced themselves, although they were close at 97% of minimum requirements for a healthy life. During the 1960s, the situation deteriorated (to 85%) but the country saw a big improvement in the 1970s. Average yields in the 1960s for both cereals and roots and tubers decreased (for cereals to a very low 600 kg/ha), although the area under crop cultivation expanded. In the heady years of the *Ujamaa* Revolution in the 1970s, the cropping area for cereals and pulses increased significantly, as did yield levels (see Table T.1). In 1980 Tanzania could easily feed its rapidly expanding population at a level that was almost 30% above WHO requirements, with cereals taking over from roots and tubers in the composition of the basic food basket. In 1961, 51% of all basic food energy came from cassava and some minor roots and tubers, and 44% from cereals (mostly maize but also sorghum, millet and some rice). In 1980 calories mainly came from cereals (54%) and the relative importance of cassava (and some other roots and tubers) had dropped to 40%. Maize, as a cereal, had become slightly less important (58% of all cereal calories) and rice production had increased so much that it already accounted for 10% of all cereal calories. In the 1980s, the area and yield levels for roots and tubers (mainly cassava and sweet potatoes) further increased and yield levels for cereals reached an all-time high (1500 kg/ha), although the area under cultivation decreased somewhat. As a result, the Tanzanian population, despite its ongoing population growth, could easily be fed with food grown in Tanzania.

However, the 1990s saw a dramatic decrease in the country's food-security situation to levels that were below the low 1961 levels and 14% below WHO requirements. What happened? Cereal areas and yields dropped a bit but this could not have been the sole cause of the fall in total food production. Problems were experienced in the yield levels of cassava, which fell to half those of a decade earlier, and they would never fully recover.

Over the last ten years, farmers have also more than doubled the area under cereals and also the area under pulses and under roots and tubers has increased considerably. In a decade, the total area growing basic food crops increased from 5.0 million ha to 8.9 million ha. As a result of an expansion of farmers' activities, the food-security situation improved again: to 19% above WHO requirements of 825,000 Cal/capita/yr. in 2011. The basic food basket in 2011 shifted away from roots and tubers and was 62% cereals, 8% pulses and 30% roots and tubers.

*Table T.1: Population and food production dynamics in Tanzania, 1961-2011*

| | 1961 | 1970 | 1980 | 1990 | 2000 | 2011 | 2011/1961 index |
|---|---|---|---|---|---|---|---|
| *Population (millions)* | | | | | | | |
| | 10.4 | 13.6 | 18.7 | 25.5 | 34.0 | 46.2 | 457 |
| *Cropping area (x m. ha of harvested crops)* | | | | | | | |
| Cereals | 1.3 | 1.7 | 2.9 | 2.6 | 2.5 | 5.7 | 438 |
| Pulses | 0.3 | 0.4 | 0.7 | 0.8 | 1.2 | 1.6 | 533 |
| Roots/tubers | 0.6 | 0.8 | 0.7 | 0.9 | 1.3 | 1.6 | 267 |
| *Yield (1000 kg/ha)* | | | | | | | |
| Cereals | 0.8 | 0.6 | 1.0 | 1.5 | 1.4 | 1.4 | 175 |
| Pulses | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.9 | 225 |
| Roots/tubers | 5.0 | 4.9 | 8.3 | 9.0 | 4.5 | 6.0 | 120 |
| *Total basic food production (million tons)* | | | | | | | |
| Cereals | 1.0 | 1.0 | 3.0 | 4.0 | 3.6 | 7.8 | 780 |
| Pulses | 0.1 | 0.2 | 0.3 | 0.5 | 0.9 | 1.4 | 1193 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roots/tubers | 3.0 | 3.7 | 5.6 | 8.4 | 5.9 | 9.8 | 327 |
| *Food energy value (x 1000 Cal/capita/year)* | | | | | | | |
| Cereals | 347 | 265 | 578 | 565 | 381 | 608 | 175 |
| Pulses | 28 | 33 | 45 | 52 | 63 | 76 | 271 |
| Roots/tubers | 405 | 381 | 420 | 462 | 243 | 297 | 73 |
| *Total* | 780 | 679 | 1043 | 1079 | 687 | 981 | 126 |

*Roots and tubers are mainly cassava and sweet potatoes in Tanzania.*
*Food energy value calculations: cereals:3600Cal/kg; pulses: 2500Cal/kg; roots and tubers: 1400Cal/kg.*
*2011 figures are provisional. The population figures are from FAO's food balance sheets, with the figure for 2011 calculated on the basis of 2008 and 2009 data and using population growth of 1.030% per annum.*

Many changes can be detected if we compare 2011 with 1961. With its population rising from 10 million to 46 million in 2011, the cropping area for cereals grew at almost the same speed, with pulses far more so, and roots and tubers at only 58% of the level of total population growth. Both for cereals and pulses, the total growth of production consisted of an area expansion of around 70% and yield improvements for the remaining 30%. For roots and tubers, yield levels in 2011 were only slightly higher than in 1961, and production increases were mostly reached by an expansion in area.
Tanzania's total area of basic food crops expanded from 2.2 million ha to 8.9 million ha between 1961 and 2011, an increase of a factor of 4 which is almost as high as the population increase in this same period.

Figure T1 shows the food sufficiency assessment for Tanzania between 1961 and 2011, based on calculations as presented in table T1.

Figure T.1

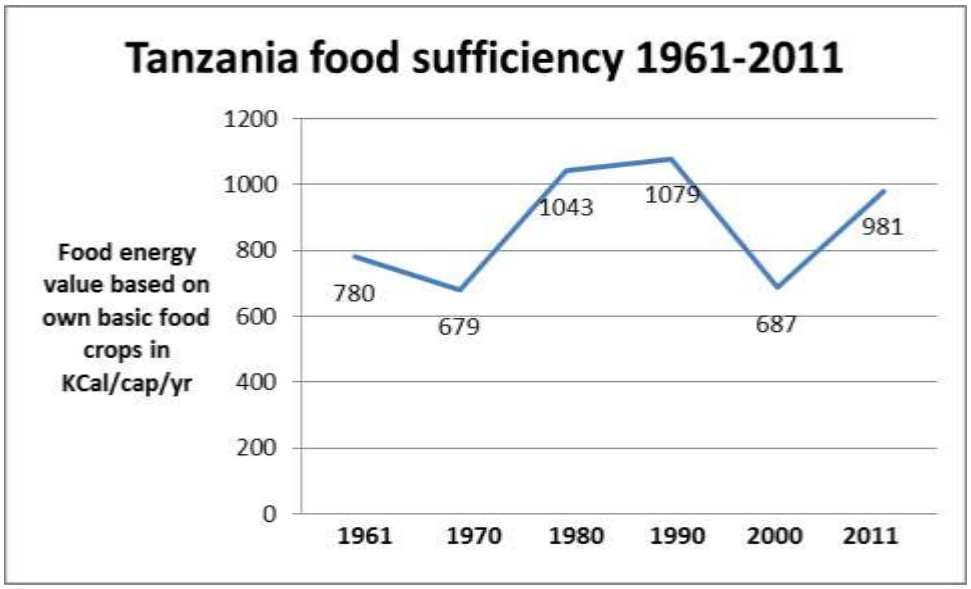
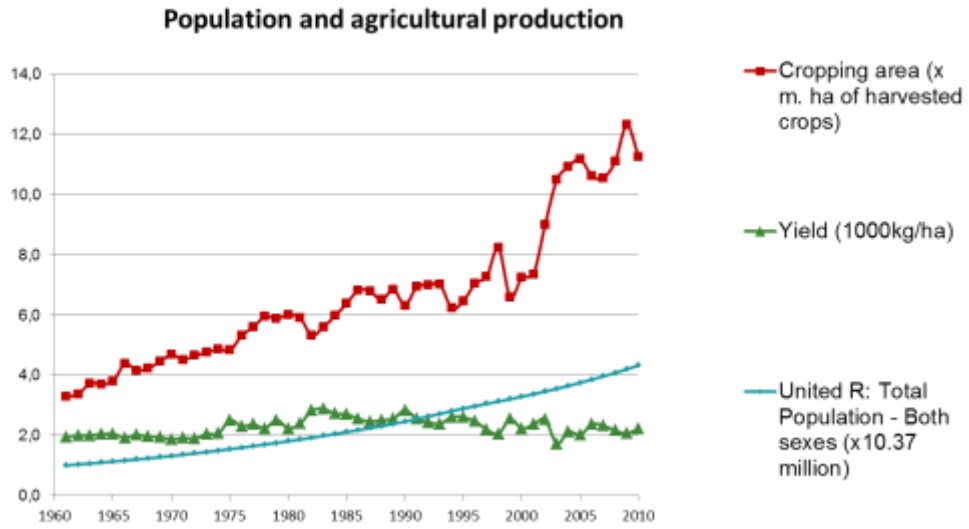
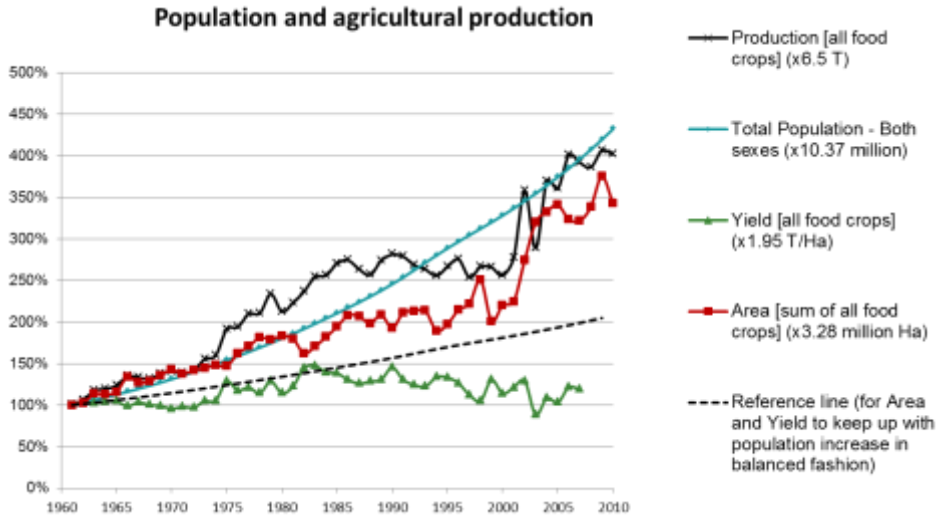



Figure T2 Tanzania




Figures T2 and T3 show the trends based on three-year averages, and based on ALL food crops, which present a more complete picture. Table T2 shows area dynamics for all Tanzania's crops.

Figure T3 Tanzania




Tanzania's basic food area increased from 58% of the country's total agricultural area to 65%, contrary to the tendencies in many other African countries (see Table T.2). There were a lot of dynamics with regard to the other agricultural crops. The harvesting area of a few relatively small crops expanded most, namely tobacco, cocoa and tea. Fruits and vegetables showed marked developments and oil crops also expanded significantly.
Tanzania still has a lot of non-agricultural space and has ample room for expansion but this would of course be at the expense of other land use. In 1961, only 4% of Tanzania's land area of 886,039 km² was in use as cropland, although there was a lot of shifting cultivation still going on so the actual land being used for crop production was higher. By 2011, land used for crop cultivation had increased to 16% of the country's total land area.

*Table T.2: Tanzania's crops: harvested area (x 1000 ha), 1961-2011*

| Crop | 1961 | 2011 | 2011/1961 |
|---|---|---|---|

| | | | index |
|---|---|---|---|
| Cereals | 1260 | 5716 | 454 |
| Pulses | 295 | 1629 | 552 |
| Roots/tubers | 607 | 1644 | 271 |
| Fibres | 450 | 546 | 121 |
| Oil crops | 569 | 2466 | 433 |
| Fruits | 209 | 931 | 445 |
| Tree nuts | 87 | 86 | 99 |
| Vegetables | 121 | 359 | 297 |
| Cocoa | 1 | 11 | 1100 |
| Coffee | 85 | 118 | 139 |
| Sugarcane | 15 | 25 | 167 |
| Tea | 6 | 20 | 333 |
| Tobacco | 5 | 168 | 336 |
| Cloves | 25 | 6 | 24 |
| Pyrethrum | 13 | 20 | 154 |
| *Total* | 3748 | 13745 | 367 |
| *Basic food/ Total* | 58% | 65% | |

Livestock

The number of pigs and chickens in Tanzania grew faster than the country's population but due to much lower growth figures for sheep and cattle, the total number of tropical livestock units increased at levels considerably below the (high) population growth, resulting in TLU levels per capita that are only 60% of the (high) 1961 levels (see table T.3). This is not as bad as developments in neighbouring Kenya but still worrying for a country where livestock wealth is regarded as an important sign of prosperity. Earlier than in Kenya there have been signs of some recovery (or at least some stabilization of per capita figures): after about 1990.

*Table T.3: Tanzania's livestock (x millions), 1961-2011*

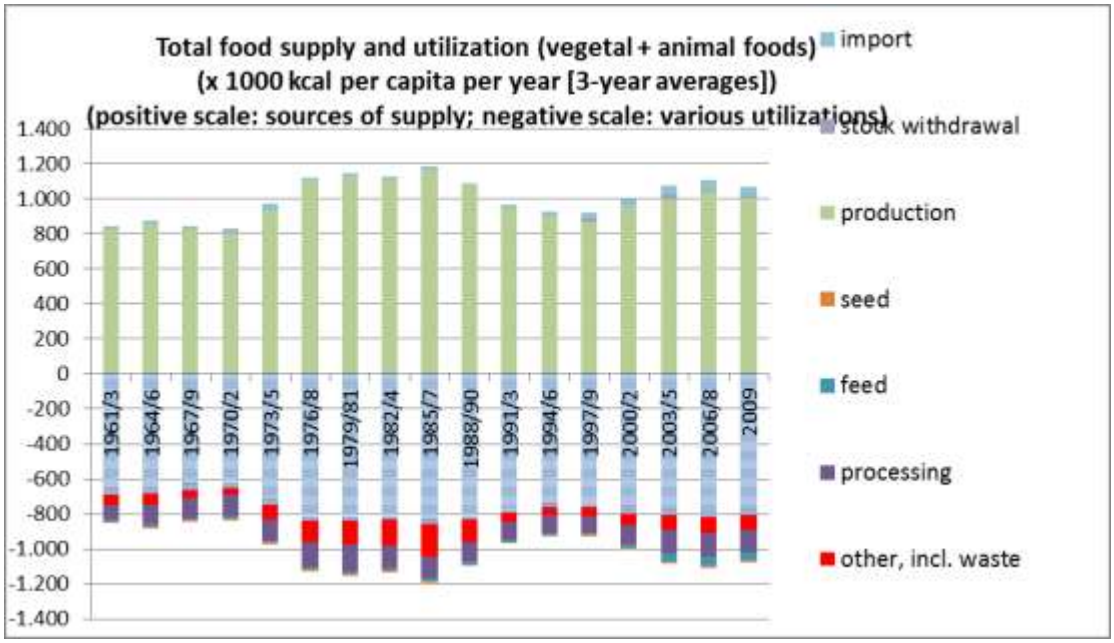
| Year | 1961 | 1970 | 1980 | 1990 | 2000 | 2011 | 2011/1961 |
|---|---|---|---|---|---|---|---|
| Cattle | 8.1 | 10.1 | 12.6 | 13.0 | 16.7 | 21.3 | 263 |
| Sheep | 3.0 | 2.8 | 3.8 | 3.6 | 3.5 | 4.3 | 143 |
| Goats | 4.5 | 4.4 | 5.7 | 8.5 | 11.9 | 15.2 | 338 |
| Pigs | 0.1 | 0.1 | 0.2 | 0.3 | 0.5 | 0.5 | 500 |
| *Total* | 15.6 | 17.4 | 22.3 | 25.4 | 32.6 | 41.3 | 265 |
| Chickens | 7.0 | 11.0 | 17.0 | 21.0 | 28.0 | 34.0 | 486 |
| *Total TLU* | 6.5 | 7.9 | 10.0 | 10.6 | 13.6 | 17.3 | 266 |
| *TLU/cap.* | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 60 |

TLU: cattle x 0.7; goats, sheep and pigs x 0.1; and chickens x 0.01.

## 2 Food balance

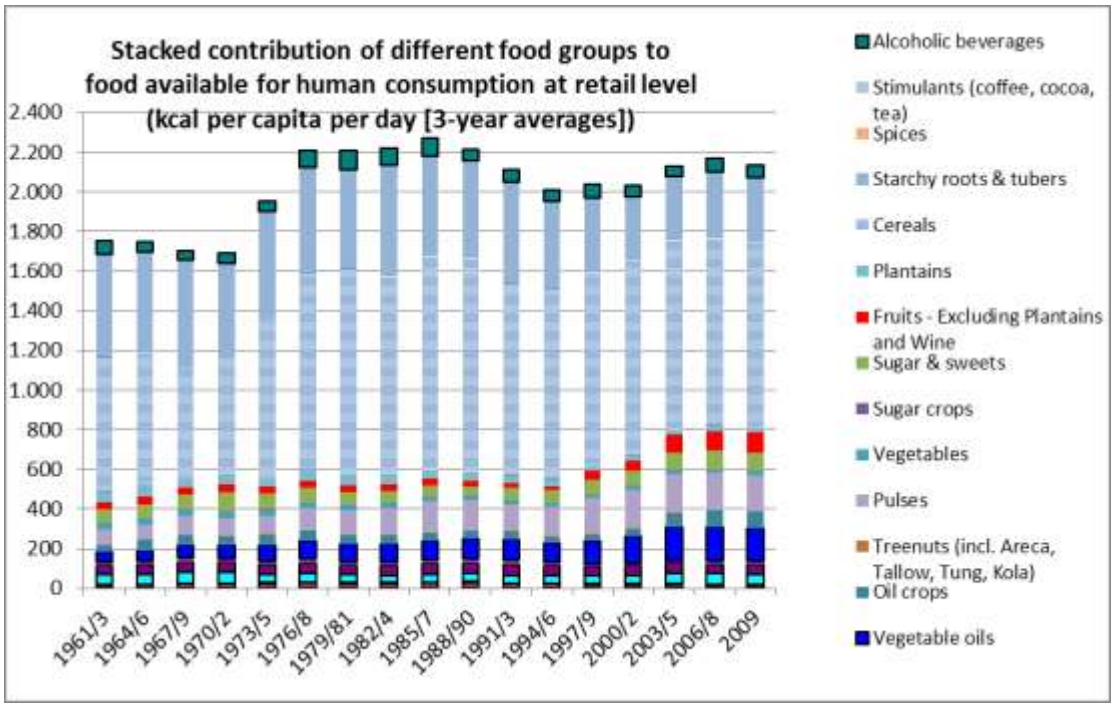
As we saw for Kenya, food availability in Tanzania does not only depend on basic food production. It depends on all food that is being produced, plus imports from abroad, plus stock withdrawal, but minus food that is exported, wasted, used as seed and as livestock feed. This gives the so-called food balance sheets, as presented by the FAO. These are presented as food energy per capita. Figures T4-T7 give the findings.

*Figure T4*




(Extra legend: purple = export; light blue = stock additions)

*Figure T 5*




(extra legend: purple = meat; light purple = fish; light blue = milk)

*Figure T 6*

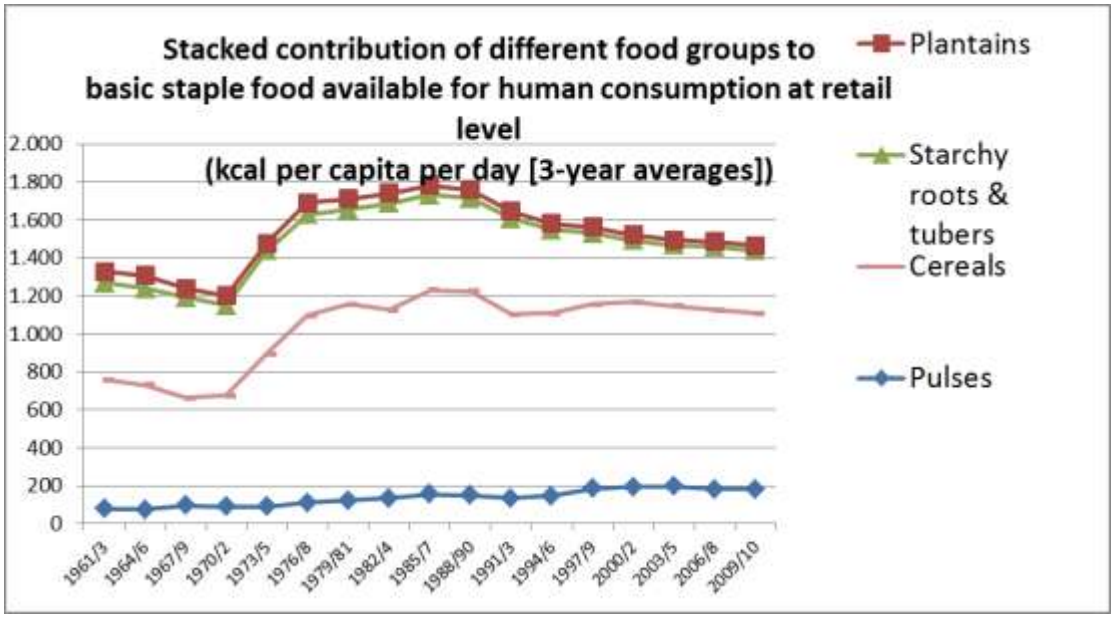
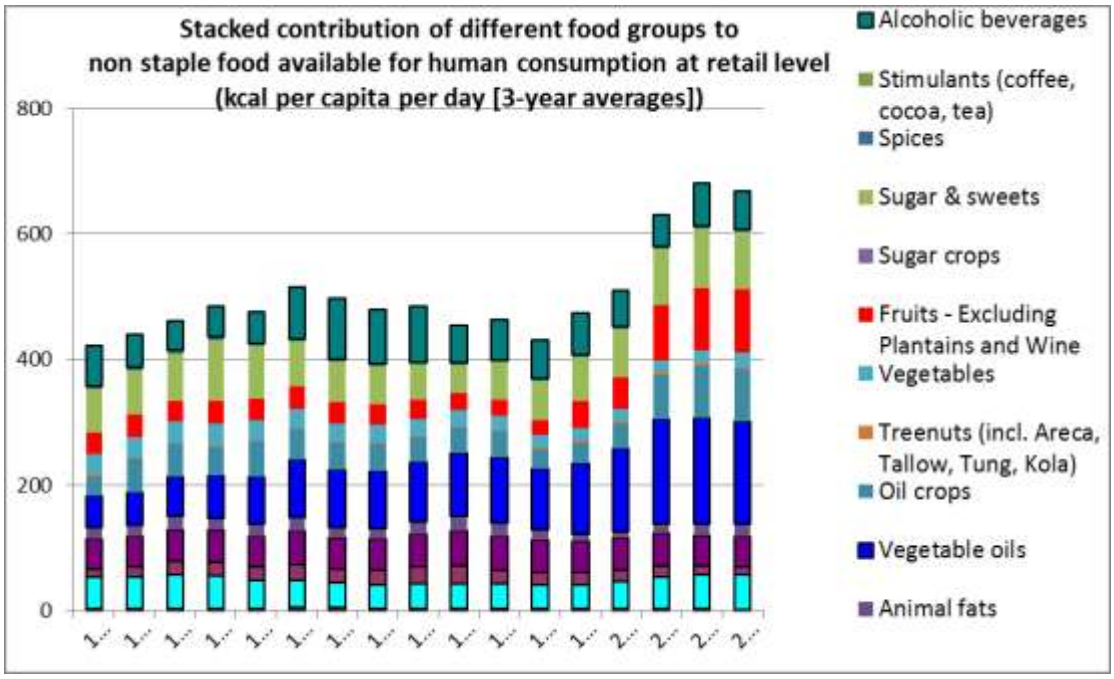



*Figure T 7*




(extra legend: purple = meat; light purple = fish; light blue = milk)

In Tanzania the total crop yield did not cope with population growth since the mid-1980s according to this analysis based on all crops that can be used for food. Total production per capita decreased in the period 1990-2005; however, it stabilized since the middle of last decade, esp. thanks to area expansion. Food imports increased since 2000. The dietary energy available for human consumption was too low in the 1960s; at a somewhat higher level since the mid-1970s thanks to cereal production, with a slight dip in the mid-1990s, then it picked up thanks to the expansion of so-called quality foods (non-basic food crops).The availability of these quality foods increased gradually till the late 1970s, then decreased, then picked up since the mid-1990s.

## 3 Tanzania: pockets of promise

If we take the faostat data for crop production and for livestock numbers (1961-2011) we can detect types of crops and livestock species of which total production grew faster than population growth. We restrict ourselves to crops with (in 2011) more than 50,000 ha of harvested area, and to the main livestock species.

We define the first category of ´successful crops and livestock´ as those with growth percentages that are higher than average population growth between 1961 and 2011, and at the same time higher than population growth between 2000 and 2011. A second category are recent additions, crops which did not yet appear in the FAO statistics in 1961 and which have become important later, with 2000-2011 growth figures beyond population growth figures. A third category concerns crops and livestock with high growth figures after 2000, but not for the period 1961-2011 as a whole. A fourth category concerns crops or livestock with a high growth for the period 1961-2011 as a whole, but slower growth, or even decline between 2000 and 2011. Tanzania's population growth between 1961 and 2011 was 445%, and between 2000 and 2011 136%.

So:
**Category 1**: high growth 1961-2011 (>4.45x) AND high growth 2000-2011 (>1.36x) and (for crops)>50,000 ha;
**Category 2**: not yet in 1961; 2000-2011 high growth (>1.36x) and (for crops)>50,000 ha; (in Tanzania: none)
**Category 3**: high growth between 2000 and 2011 (>1.36), but lower than population growth figures for the 1961-2011 period (<4.45x) and (for crops)>50,000 ha;
**Category 4**: high growth 1961-2011 (>4.45x), but slower growth 2000-2011 (<1.36x) and (for crops) >50,000 ha.
Details are given in table T4.

*Table T4 most successful Tanzanian crops and livestock*

| Crop/ livestock | KHa/ Numbers in 2011 | Production growth | | Yield growth | | Area growth | |
|---|---|---|---|---|---|---|---|
| | | 2011/ 1961 | 2011/ 2000 | 2011/ 1961 | 2011/ 2000 | 2011/ 1961 | 2011/ 2000 |
| **Category 1** | | | | | | | |
| Maize | 3,288 | 7.4 | 2.2 | 1.8 | 0.7 | **4.2** | **3.2** |
| Rice paddy | 1,119 | 23.9 | 2.9 | 1.8 | 1.1 | **13.6** | **2.7** |
| Sunflower | 754 | 64.5 | 5.8 | 2.9 | 1.6 | **22.2** | **3.6** |
| Sw.potatoes | 699 | 16.6 | 17.2 | 0.7 | **10.0** | **22.5** | 1.7 |
| Groundnuts | 675 | 16.3 | 12.5 | 1.0 | 2.2 | **16.9** | **5.8** |
| Bananas | 532 | 36.5 | 4.5 | 2.3 | **2.6** | **16.1** | 1.8 |
| Pigeon peas | 288 | 27.3 | 3.2 | 1.5 | 1.5 | **18.0** | **2.2** |
| Cow peas | 218 | 10.8 | 1.6 | 2.6 | 1.1 | **4.1** | **1.5** |
| Potatoes | 203 | 103.7 | 2.6 | 2.6 | 1.0 | **40.6** | **2.7** |
| Peas dry | 190 | 31.3 | 3.0 | 1.7 | 1.0 | **19.0** | **3.0** |
| Tobacco | 168 | 48.1 | 4.9 | 1.5 | 1.3 | **33.6** | **3.8** |
| Sesame | 145 | 9.0 | 2.8 | 2.2 | **1.9** | **4.1** | 1.5 |
| Pulses oth. | 120 | 22 | 1.8 | 2.4 | 1.1 | **9.2** | **1.6** |
| Wheat | 108 | 18.5 | 3.4 | 1.4 | **2.3** | **13.5** | 1.5 |
| Chick peas | 75 | 21.6 | 2.6 | 2.9 | **2.1** | **7.5** | 1.2 |
| **Category 3** | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Seed cotton | 490 | 3.1 | 2.6 | 1.5 | 1.1 | **2.0** | **2.3** |
| Coconut | 323 | 2.4 | 1.5 | 1.3 | **2.2** | **1.9** | 0.7 |
| Fresh veget | 286 | 2.8 | 1.9 | 1.1 | 0.9 | **2.6** | **2.1** |
| Category 4 | | | | | | | |
| Sorghum | 811 | 4.5 | 1.3 | 1.1 | **1.2** | **4.1** | 1.1 |
| Chickens | 34.0m | 4.9 | 1.2 | | | | |
| Pigs | 0.5m | 5.4 | 1.1 | | | | |

**4. Periods of successful breakthroughs in the pockets of promise**

Tables T5 and T6 present two ways of reporting about the periodization of success. These 19 successful crops in 2011 represent 76% of all crop land in Tanzania. During the 1961-2011 period as a whole area expansion was the main reason of production growth. If we focus on the 2000-2011 period for a few crops it becomes clear that yield improvements and not area expansion is the main reason for production growth.

Only one crop (potatoes) showed a growth consistently higher than population growth for all decades between 1961 and 2011. For potatoes the peak growth was in the 1970s. Six crops experienced high growth figures in four out of five decades: rice (peak growth in the 2000s) pigeon peas (peak growth in the 2000s), cowpeas (peak growth in the 1970s), dry peas (peak growth in the 2000s), tobacco (peak growth in the 2000s, and other pulses (peak growth in the 1990s). Seven crops (maize, sunflowers, bananas, sesame, wheat, chick peas and coconuts) experienced high growth rates in three out of five decades and this is also true for chickens. Chick peas and wheat had their highest growth peak in the 1960s, maize and chickens in the 1970s and sunflowers, bananas, and sesame in the 2000s. Three crops and one type of animals only experienced high growth in two out of five decades:, pigs (with peak growth in the 1980s) and sweet potatoes, groundnuts and seed cotton (with peak growth in the 2000s). Finally, fresh vegetables experienced one decade of high growth, the most recent decade, and sorghum also experienced only one decade of relatively fast growth, the 1970s.

If we look at the decades then the 2000s was by far the best one in high crop and livestock growth performance, with high growth in eighteen of the twenty-one categories and in twelve instances also the highest-ever performance. However, the picture is quite nuanced if we look at all decades together in a comparative perspective. Each decade has some breakthrough crops (there is no 'lost decade' in Tanzania's agriculture), but with a slightly better performance before 1980 and a far better performance after 2000. Tanzania's agriculture has become a success story.

*Table T5 Most successful crops and livestock: success periods; in figures*

*In italics: figures higher than population growth for the decade*

**In bold: the decade with the highest growth**

| **Crops/ Livestock** | **1961-1970** | **1970-1980** | **1980-1990** | **1990-2000** | **2000-2011** |
|---|---|---|---|---|---|
| *Population* | *1.31* | *1.38* | *1.36* | *1.33* | *1.36* |
| **Category 1** | | | | | |
| Maize | 0.83 | ***3.54*** | *1.42* | 0.80 | *2.21* |
| Rice paddy | *1.40* | *2.20* | *2.54* | 1.06 | ***2.88*** |
| Sunflower | 1.21 | *2.70* | 0.75 | *4.50* | ***5.83*** |
| Sw.potatoes | 1.14 | *2.25* | 0.72 | 0.52 | ***17.20*** |

| | | | | | |
|---|---|---|---|---|---|
| Groundnuts | 0.85 | *1.60* | 1.11 | 0.87 | ***12.53*** |
| Bananas | *1.58* | 1.08 | 1.11 | *4.26* | ***4.49*** |
| Pigeon peas | *1.68* | 1.36 | *2.33* | *1.57* | ***3.24*** |
| Cow peas | 0.76 | ***3.23*** | *1.90* | *1.47* | *1.58* |
| Potatoes | *3.69* | ***4.16*** | *1.80* | *1.45* | *2.59* |
| Peas dry | *2.07* | 1.21 | *2.93* | *1.43* | ***2.99*** |
| Tobacco | *4.43* | *1.40* | 0.98 | *1.60* | ***4.93*** |
| Sesame | 0.93 | 1.33 | *1.93* | *1.34* | ***2.82*** |
| Pulses oth. | 0.94 | *1.49* | *2.57* | ***3.33*** | *1.83* |
| Wheat | ***9.34*** | *1.58* | 1.18 | 0.31 | *3.45* |
| Chick peas | ***3.16*** | 0.72 | *2.93* | 1.26 | *2.56* |
| **Category 3** | | | | | |
| Seed cotton | *2.27* | 0.77 | 0.85 | 0.83 | ***2.55*** |
| Coconut | *1.39* | 0.96 | *1.47* | 0.81 | ***1.49*** |
| Fresh veget | 1.24 | 1.18 | 1.11 | 0.94 | ***1.85*** |
| **Category 4** | | | | | |
| Sorghum | 0.96 | ***2.97*** | 0.91 | 1.29 | 1.35 |
| Chickens | *1.54* | ***1.57*** | 1.21 | *1.36* | 1.22 |
| Pigs | 1.27 | 1.35 | ***2.01*** | *1.41* | 1.11 |
| *Successes nr* | 12 | 11 | 11 | 11 | **18** |
| *Highest growth nr* | 2 | 4 | 1 | 1 | **12** |
| *Decline* | 5 | 3 | 4 | 7 | **0** |

*Table T6 Most successful crops and livestock: success period; in colours*

In yellow: figures higher than population growth for the decade

In green: also the decade with the highest growth

In red: decline

| **Crops/ Livestock** | **1961-1970** | **1970-1980** | **1980-1990** | **1990-2000** | **2000-2011** |
|---|---|---|---|---|---|
| *Population* | *1.31* | *1.38* | *1.36* | *1.33* | *1.36* |
| Maize >> | 0.83 | ***3.54*** | *1.42* | 0.80 | *2.21* |
| Rice paddy >> | *1.40* | *2.20* | *2.54* | 1.06 | ***2.88*** |
| Sunflower >> | 1.21 | *2.70* | 0.75 | *4.50* | ***5.83*** |
| Sw.potatoes >> | 1.14 | *2.25* | 0.72 | 0.52 | ***17.20*** |
| Groundnuts >> | 0.85 | *1.60* | 1.11 | 0.87 | ***12.53*** |
| Bananas >> | *1.58* | 1.08 | 1.11 | *4.26* | ***4.49*** |
| Pigeon peas >> | *1.68* | 1.36 | *2.33* | *1.57* | ***3.24*** |
| Cow peas >> | 0.76 | ***3.23*** | *1.90* | *1.47* | *1.58* |
| Potatoes >> | *3.69* | ***4.16*** | *1.80* | *1.45* | *2.59* |
| Peas dry >> | *2.07* | 1.21 | *2.93* | *1.43* | ***2.99*** |
| Tobacco >> | *4.43* | *1.40* | 0.98 | *1.60* | ***4.93*** |
| Sesame >> | 0.93 | 1.33 | *1.93* | *1.34* | ***2.82*** |
| Pulses oth. >> | 0.94 | *1.49* | *2.57* | ***3.33*** | *1.83* |
| Wheat >> | ***9.34*** | *1.58* | 1.18 | 0.31 | *3.45* |
| Chick peas >> | ***3.16*** | 0.72 | *2.93* | 1.26 | *2.56* |

| | | | | | |
|---|---|---|---|---|---|
| Seed cotton <> | *2.27* | 0.77 | 0.85 | 0.83 | ***2.55*** |
| Coconut <> | *1.39* | 0.96 | *1.47* | 0.81 | ***1.49*** |
| Fresh veget >< | 1.24 | 1.18 | 1.11 | 0.94 | ***1.85*** |
| Sorghum | 0.96 | ***2.97*** | 0.91 | 1.29 | 1.35 |
| Chickens >< | *1.54* | ***1.57*** | 1.21 | *1.36* | 1.22 |
| Pigs >< | 1.27 | 1.35 | ***2.01*** | *1.41* | 1.11 |
| *Successes nr* | 12 | 12 | 11 | 11 | **18** |
| *Highest growth nr* | 2 | 5 | 1 | 1 | **12** |
| *Decline* | 6 | 3 | 5 | 7 | **0** |

**5. The down side: crops and livestock that failed to grow adequately**

Categories 1-4 given above show crops of which the production grew faster than population growth in 1961-2011 or in 2000-2011 or in both periods. In this last section we will look at crops and livestock with production growth lower than population growth.

In theory there are four categories:
**Category 5:** both in 1961-2011 and in 2000-2011 production growth lower than population growth, but positive.\
**Category 6**: in 1961-2011 negative growth, but in 2000-2011 positive growth, but lower than population growth.
**Category 7**: in 1961-2011 positive growth but lower than population growth, but in 2000-2011 negative growth
**Category 8**: both in 1961-2011 and in 2000-2011 negative growth.

| **Crops/ Livestock** | **1961-1970** | **1970-1980** | **1980-1990** | **1990-2000** | **2000-2011** |
|---|---|---|---|---|---|
| **Category 5** | | | | | |
| Coffee | *1.4* | 1.0 | 1.1 | 0.9 | 1.3 |
| Millets | 1.1 | *2.2* | 0.6 | 1.1 | 1.1 |
| Plantains | *1.6* | 1.1 | 1.1 | 0.9 | 1.3 |
| Cattle | 1.3 | 1.2 | 1.0 | 1.3 | 1.3 |
| Goats | 1.0 | 1.3 | *1.5* | *1.4* | 1.3 |
| Sheep | 0.9 | 0.1 | 9.4 | 1.0 | 1.2 |
| **Category 6** | | | | | |
| Sisal | 1.0 | 0.4 | 0.4 | 0.6 | 1.2 |
| **Category 7** | | | | | |
| Cashew | 2.1 | 0.4 | 0.4 | 7.1 | 0.6 |
| Cassava | 1.2 | 1.4 | 1.6 | 0.7 | 0.9 |

KHa in 2011: coffee: 118, millets: 350, plantains: 280, sisal: 56, cashew: 80, cassava: 740.