Agricultural dynamics and food security trends in Uganda

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Developmental Regimes in Africa (DRA) Project
ASC-AFCA Collaborative Research Group:
Agro-Food Clusters in Africa (AFCA)

Research Report 2013-ASC-2

London/Leiden, December 2013

Published on behalf of the Africa Power and Politics Programme (APPP) by the Overseas Development Institute, 111 Westminster Bridge Road, London SE1 7JD, UK (www.odi.org.uk).

The APPP Working Paper series is edited by Richard Crook, Professorial Fellow, Institute of Development Studies at the University of Sussex, Brighton BN1 9RE, UK (r.crook@ids.ac.uk).

The Africa Power and Politics Programme is a consortium research programme funded by the UK Department for International Development (DFID), with additional support from Irish Aid, for the benefit of developing countries. The views expressed in this publication are those of the author and not necessarily those of DFID, Irish Aid or the Programme as a whole. The African Power and Politics Programme works together with the African Studies Centre Leiden and with Leiden University in the Developmental Regimes in Africa programme, funded by the Netherlands Ministry of Foreign Affairs. These research reports are co-funded by the African Studies Centre in Leiden.

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General introduction to the four DRA/ASC-AFCA Research Reports

From 'Tracking Development' to 'Developmental Regimes in Africa' and 'Agro-Food Clusters in Africa': further research questions

Between 2007 and 2012 the Netherlands Ministry of Foreign Affairs funded a research project to compare the long-term developments in Southeast Asia and Sub-Saharan Africa. Long-term meant: with a focus on the second half of the 20th century. The main research question was: how could countries, which were all having low levels of socio-economic performance in the 1950s, differ so much in economic performance in the following decades? The research team consisted of researchers from the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV) and the African Studies Centre, both in Leiden, together with senior and PhD researchers in four Southeast Asian and four African countries, which were compared one-to-one: Nigeria with Indonesia, Uganda with Cambodia, Kenya with Malaysia and Tanzania with Vietnam.[1] One of the main conclusions drawn by project leaders David Henley (KITLV) and Jan Kees van Donge (ASC) was that the economic breakthrough in Southeast Asia can only be well understood if one looks at the massive state-led rural development campaigns from the 1960s onwards, which resulted in a major agricultural revolution and in generally successful rural poverty alleviation on a mass scale. This was much less so in Africa, where many political leaders in post-colonial governments have made different choices, neglecting the rural peasants and trying to implement an elite-based industrialization strategy that had disappointing results (Henley & van Donge 2012; Vlasblom 2013).[2] The DfID-funded Africa Power and Politics Project (APPP) came to a comparable conclusion, focusing on Africa's ruling elites: these elites exploited or ignored the rural masses and can be held responsible for economic stagnation and rampant poverty and hunger. The important scientific and policy question can then be asked: if Africa would put more emphasis now on its agricultural sector (like Southeast Asia did from the 1960s onwards), would it be possible to repeat the 'growth miracle' and combine an agriculture-based rapid growth strategy, with a successful poverty alleviation strategy, particularly in the rural areas?

Although these main conclusions were shared by most participants in the Tracking Development team, there is quite some controversy about the causal factors, and about more recent trends. Based on statistical evidence from FAO sources (FAOSTAT), four DRA/ASC-AFCA Research Reports deal with these dynamics and with recent trends and show that a) not all was gloomy in Africa's agricultural performance between 1960 and 2000, and that b) from about 2000 onwards major breakthroughs can be seen, suggesting that Africa's agricultural

[1] Results of the Tracking Development project can be found in Berendsen, B., T. Dietz, H. Schulte Nordholt & R. van der Veen (2013), *Asian Tigers, African Lions. Comparing the Development Performance of Southeast Asia and Africa*. African Dynamics, Vol.12 Leiden: Brill. The chapter most relevant to this working paper series is Dietz T. (2013), Comparing the agricultural performance of Africa and Southeast Asia over the last fifty years: pp. 85-128, and for this working paper on Uganda: Leliveld, A. & H. ten Brummelhuis (2013) Agricultural policies and performance in an African and Asian poor agrarian society: Uganda and Cambodia compared: pp. 419-452.

[2] Henley, D. & J.K. van Donge (2012), Policy for development in Africa: Learning from Southeast Asia. London Developmental Regimes in Africa Policy Brief 01; Vlasblom, D. (2013), *The richer harvest. Economic development in Africa and Southeast Asia compared*. Leiden: African Studies Centre.

sector *is* improving, or even that Africa is already experiencing an 'agricultural revolution', although a different one than Southeast Asia's "Green Revolution". The Research Reports focus on the four African case-study countries in the Tracking Development project: Nigeria, Uganda, Kenya and Tanzania. For each country four types of analysis are presented: (1) agricultural production trends in the 1960-2011 period, (2) food balance trends during this period, combining these agricultural food production data with data on trade and consumption, (3) high-growth agricultural products in the 2000-2010 period ('agricultural islands of effectiveness'), and (4) data on food security, based on child undernutrition surveys, and (if available) trends. The Research Reports also include some relevant maps made available by the Centre for World Food Studies in Amsterdam. For each country, the Research Report ends with suggestions for a follow-up research agenda and with a first inventory of useful sources, made by the ASC's library and documentation unit.

These four DRA/ASC-AFCA Research Reports are the first results of a Collaborative Research Group at the African Studies Centre in Leiden dealing with Agro-Food Clusters in Africa. Other studies will follow, both about these four countries and about other African countries. The research group intends to study four types of 'drivers of agricultural innovation breakthroughs and blockages': (i) urbanization and urban demand development for agricultural produce from relevant hinterlands; (ii) demand from elsewhere (for food, biofuels, and other export crops); (iii) business development and institutional arrangements in relevant value chains; and (iv) agricultural and rural development policies and practices. In the Tracking Development and APPP groups, the latter 'driver' received a lot of attention. In the ASC-AFCA team we tend to give due emphasis to the first driver of agricultural breakthroughs, which are currently happening all over Africa. We hope to be able to form research teams for particular agricultural products to do a detailed and, if possible, comparative (intra-African) analysis to determine the relative strengths of each of these four drivers of change for each of the 'agricultural islands of effectiveness' in the four countries and elsewhere in Africa.

One methodological remark should be made beforehand. Although FAO puts a lot of effort in its statistical data base, many researchers doubt the accuracy of these data. Some researchers even state that these data should not be used, and certainly not if one wants to compare countries. While acknowledging these caveats, in the Tracking Development project and in this DRA/ASC-AFCA follow-up research (as well as in the broader ASC-AFCA project) we are convinced that the FAOSTAT data collected over the past 50 years represent a unique statistical resource and deserves to be explored and exploited as a *starting point* and possible background canvas for any discussion about food security trends in the case study countries. However: it should be triangulated with other sources and treated with caution.

1. Introduction

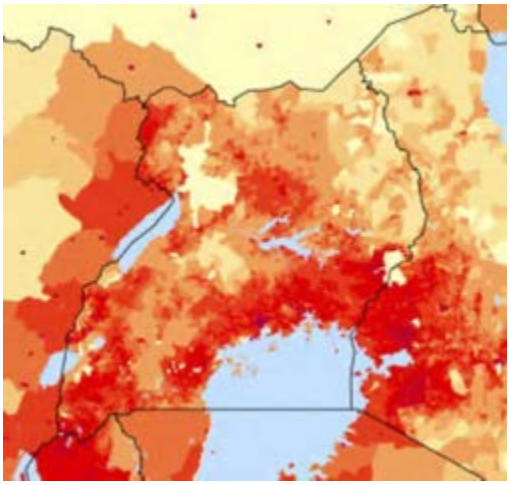
Uganda is a country in East Africa with 111 districts and the capital city of Kampala (Ministry of Local Governance: http://molg.go.ug/local-governments, accessed 18 October 2013) and relatively high population densities, particularly in the Central districts neighbouring Lake Victoria, and the districts in the Southwest and some districts in the Northwest (see Figure 2).

Its urban areas are relatively few: basically these include the agglomeration of the capital Kampala (estimated to have about 1.9 inhabitants) and some smaller towns (between 80,000 and 150,000 inhabitants) such as Gulu and Lira in the North, Mbale in the Northeast, Jinja in the Central region and Mbarara and Kasese in the Southwest. A landlocked country, most of Uganda's import and export trade goes via Kenya (Mombasa-Nairobi-Kisumu-Kampala) and by air to and from Entebbe Airport. East Congo as well as Rwanda in its turn depend on Uganda (and indirectly Kenya) for its trade and travel links. Figure 3 gives an overview of Uganda's (peri-)urban population.

Figure 1: Uganda: administrative areas

Source: en.wikipedia.org

Figure 2: Population densities



Source: bioval.jrc.ec.europa.eu

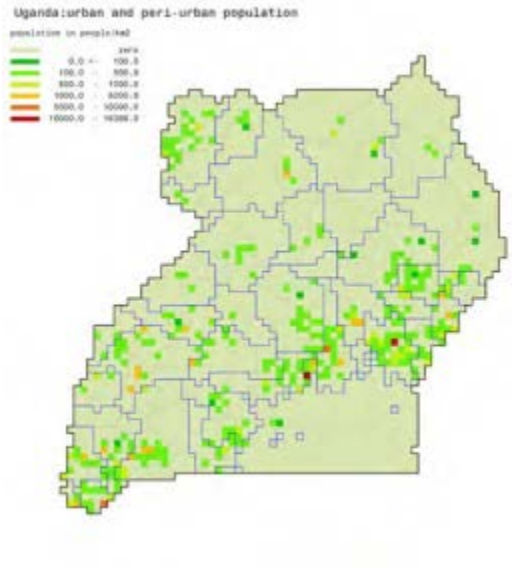


Figure 3: Urban and peri-urban areas in Uganda

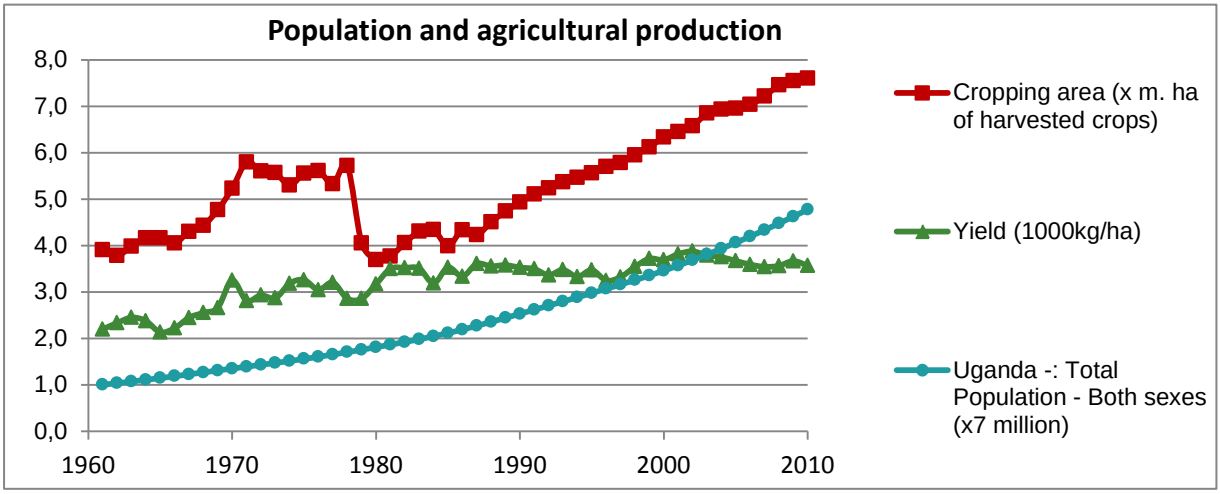
Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies *('zero' = rural or water)*

2 Uganda's agricultural dynamics, 1960-2010

Uganda has always been presented as excellent for the development of a high-performing agricultural sector because of its favourable agro-climatic conditions. At Independence, in 1962, Uganda was perceived by many observers as a food basket for East Africa. Ugandan agriculture is mainly rain-fed, and rainfall in most parts of the country is plentiful and allows for double cropping, in particular in the Central and Western districts, where about 55% of the population lives and most agricultural production is located. Ugandan farming systems are characterized by mixed cropping, combining plantains (*matooke*), cassava, millet, sorghum, sweet potatoes, beans, or maize with one or two export crops like coffee, cotton, cocoa, and tobacco. More recently, cattle-raising and milk production have become increasingly important in Ugandan agriculture (Leliveld & ten Brummelhuis 2013:421-2). Ugandan agriculture is basically smallholder agriculture, in which low-cost inputs and traditional, labour-intensive farming techniques are applied. During the colonial period, the British decided not to develop large-scale plantations in Uganda, with the exception of tea and sugar estates, but introduced cotton and coffee together under a 'forced system of cultivation' (Leliveld & ten Brummelhuis 2013: 422-3).

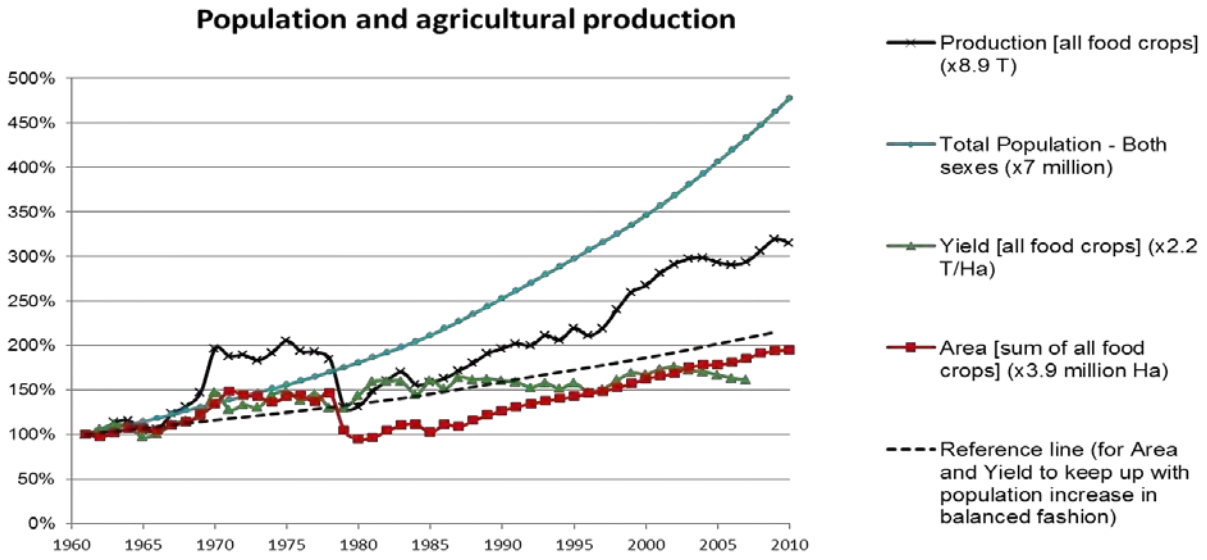
According to FAO data, in the 1960s agricultural production thrived: thanks mainly to area expansion, but also to yield improvements food production in Uganda increased more than population. In the 1970s this process halted, and around 1980 the agricultural area decreased to a much lower level. After 1990 recovery started, visible in steady increase of cropping areas. However, Uganda has some of the highest population growth figures in Africa (around 3% per annum) and agricultural growth can hardly cope with population growth. Overall, yield levels stagnate since the 1980s (see Figure 4). Looking at the trend since 1961 (Figure 5), we can see that food production did not keep up with population growth for the period as a whole. With a population almost five times the level of 1961 food production only increased by a factor three during the last fifty years: a doubling (100% growth) of the food cropping area and only 50% growth of yield levels.

Figure 4: Uganda 1961-2011: population figures, growth in cropping area and crop yield increases



Source: FAOSTAT data, Final 2011 data, Updated: 08 August 2013, Accessed on 17 September 2013 from http://faostat.fao.org/site/567/default.aspx#ancor

Figure 5: Uganda 1961-2011: population and food crop growth indexes with 1961 as a baseline



Source: Derived from FAOSTAT data, see Figure 4.

What happened after the initial good years in the 1960s? As is well-known, Uganda was plagued by violent regimes and conflict in the 1970s and 1980s. The regimes of first Idi Amin (1971-1979) and later Milton Obote II (1979-1985) resulted in a major economic crisis in Uganda that is also visible in the agricultural performance of a country that was long seen as a land of milk and honey. If we consider the demographic data, Uganda did not show actual depopulation during these horror decades, but for instance loss of lives due to the conflict in the Amin period between 1972 and 1979 is estimated at 500,000 people from a total population of almost 12 million people (Leliveld & ten Brummelhuis 2013: 423). Despite these losses, there is a slightly lower population increase during the Amin and Obote years, but the long-term demographic trend shows one of the highest population growth rates on Earth based on very high fertility figures. In total, the country's population has grown almost five-fold between 1961 and 2009.

At independence, Uganda could easily feed its population, as it produced enough cereals (millets, sorghum and some maize), various types of pulses, and roots and tubers (particularly cassava and sweet potatoes). However, these food crops do not give the total picture for Uganda. Plantains are a very important source of food energy in particularly Central and Southwest Uganda, and in 1961 were even more important than cereals or roots and tubers. If we add plantains to the picture of food energy values, Uganda's population had a very good level of potential food self-sufficiency in 1961. The situation improved even further in the 1960s and the area harvested expanded for all crops, and yield levels also improved considerably. As a result, on average Uganda was potentially able to feed its population more than adequately and functioned as the region's food basket, and also using a lot of its food in ways that were less food energy efficient (e.g. to brew beer or feed animals).

Table 1 shows that the situation had become problematic by 1980. Most food crop areas contracted during these difficult years.

Table 1: Population and basic food production dynamics in Uganda, 1961-2011

	1961	1970	1980	1990	2000	2011	2011/1961, index
Population (millions)[1]	7.0	9.4	12.7	17.7	24.2	34.5	492
Cropping area (ha of harvested crops, x million)[2]							
Cereals	1.0	1.2	0.7	1.1	1.4	1.7	172
Pulses	0.3	0.4	0.3	0.6	0.9	1.2	445
Roots/tubers	0.5	1.0	0.6	0.9	1.0	1.1	228
Plantain	0.6	0.9	1.2	1.4	1.6	1.7	278
Yield (kg/ha x 1000)							
Cereals	0.9	1.4	1.5	1.5	1.5	2.1	230
Pulses	0.6	0.6	0.6	0.8	0.7	0.5	85
Roots/tubers	3.7	4.3	6.2	6.2	7.7	7.6	207
Plantain	6.0	8.4	4.9	5.6	5.9	5.6	93
Total basic food production (million tons)							
Cereals	0.9	1.7	1.1	1.6	2.1	3.5	395
Pulses	0.2	0.3	0.2	0.5	0.6	0.7	378
Roots/tubers	1.7	4.3	3.4	5.3	7.8	8.1	471
Plantain	3.7	7.7	5.7	7.8	9.4	9.6	259
Food energy value of crop mix (kcal/kg) [recalculated from FAOSTAT]							
Cereals	2877	2875	2930	2940	3007	2944	102
Pulses	3406	3399	3391	3397	3396	3402	100
Roots/tubers	1030	982	1019	1029	1006	1010	98
Plantain	889	890	891	890	891	890	100
Weighed total [inferred]	1268	1204	1189	1233	1233	1342	106
Food energy value (kcal/capita/year x 1000)							
Cereals	368	503	249	262	262	302	82
Pulses	84	96	49	96	82	64	77
Roots/tubers	252	447	277	310	326	236	94
Sub-total	703	1046	576	669	669	603	86
Plantain	470	722	401	394	347	248	53
Total	*1173*	*1768*	*977*	*1063*	*1016*	*850*	*72*
Food energy value (kcal/capita/day)							
Cereals	1006	1377	683	719	718	826	82
Pulses	230	263	135	263	223	176	77
Roots/tubers	690	1224	758	850	892	647	94
Plantain	1286	1976	1098	1080	949	678	53
Total	*3212*	*4840*	*2674*	*2911*	*2782*	*2328*	*72*

[1] Population data and standard food composition: FAOstat Food Balance Sheets; all production data: FAOstat crop production.

[2] Roots and tubers are mainly cassava and sweet potatoes in Uganda. Cereals are mostly maize, millet, sorghum and later also rice. In 1961 millet and sorghum accounted for 82% of cereal production; around 2010 it was only 43%; maize increased from 18% to 49%.

collapsed. The origin of the breakdown of the agricultural sector had started as early as 1972 with the expulsion of 92,000 Asians, which hugely affected the agricultural marketing and processing system (Leliveld & ten Brummelhuis 2013:423). Total basic food crop production almost halved, although people could still easily be fed (to even 18% above WHO norms of 825,000 kilocalories/capita/year if we use 2260 kcal/capita/day as a yardstick for a healthy life; if we would use 2000 kcal/capita/day – with a population with such a wide base of the population pyramid, that would be more realistic, it would even be 34% above sufficiency requirements. During the early 1980s, which were difficult as well under the erratic and oppressive Obote II regime, the food crop production hardly expanded again and yield levels either stabilized or declined. The growth in agricultural production resumed after Yoweri Museveni and his National Resistance Movement (NRM) took power in 1986. Until the mid-2000s, Uganda had realized a substantial increase in agricultural production, far beyond levels that were realized in the period 1960-1987 and notwithstanding continued civil strife in the north until 2006. The rise of agricultural production was mainly driven though by expanding land use, and not by raising yields, except for the cassava sector. Farmer yields were 13% to 49% of potential yields found on research stations, and yields of major crops have been stagnant or declining since the early 1990s (Deininger & Okidi 2001, Nabbumba & Bahiigwa 2003). Field studies show that few purchased inputs are used on smallholder plots, with only 1% of farmers using chemical fertilizer and 6.3% reporting the use of improved seeds (Gollin & Rogerson 2010). Despite the substantial production increase, the very high population growth in this period meant that per capita food availability decreased a little. Over the last decade, this process has continued and there have been improvements in production levels but not enough to keep pace with the country's population growth. Uganda can still easily feed its population but the idea of it being a food basket for the larger region has begun to be challenged.

If we compare 1961 and 2011, average overall potential food sufficiency dropped from 1,173,000 kcal/cap/year to 850,000 kcal/cap/yr. The composition of the food basket also changed considerably. In 1961 plantains were most important (40% of total basic food energy), followed by cereals (31%, mainly millets and sorghum), roots and tubers (21%, mainly cassava and sweet potatoes) and finally pulses (7%). By 2010, cereals had taken the lead position (35%, but now mainly maize and some millet, sorghum, rice and wheat), followed by roots and tubers (28%; mainly sweet potatoes but also cassava and potatoes), followed by plantains (29%), and pulses (8%). The production increases in cereals and roots and tubers between 1961 and 2010 can be attributed, almost 1:1, to area expansion and yield improvements. It should be noted here though that with regards to yields great inconsistencies exist between the FAO data and data derived from local surveys and the Ministry of Agriculture, Animal Industry and Fisheries (see below). For pulses and plantains, increased production levels were reached by area expansion, which also had to make up for yield decreases.

Table 2 looks at food production in more detail. In terms of production volumes rice, maize and potatoes have been the crops with most rapid expansion. This was realized mainly through area expansion, while the yield of the cereals doubled, contrary to the yield of potatoes, which fell by 25%. But also dry beans, sweet potatoes, pigeon peas and cassava

Table 2: Uganda: more detailed crop statistics for basic food crops with at least 90,000 t production in 2011: comparison 1961 and 2011*

Crop	Harvested area (x 1000 ha)			Yield (kg/ha)			Production (x m kg)		
	1961	2011	2011/ 1961 index	1961	2011	2011/ 1961 index	1961	2011	2011/ 1961 index
Plantains	616	1715	278	6007	5598	93	3700	9600	259
Cassava	317	426	134	3533	11165	316	1120	4758	425
Sweet potatoes	141	532	377	3511	4803	137	495	2554	**516**
Maize	178	1063	596	1098	2400	219	196	2551	**1302**
Potatoes	11	111	1007	9091	6904	76	100	765	**765**
Beans, dry	140	983	702	714	455	64	100	447	447
Sorghum	292	364	125	945	1201	127	276	437	158
Millet	519	172	33	809	1698	210	420	292	70
Rice, paddy	3	90	3422	1217	2589	213	3	233	**7281**
Pigeon peas	57	102	179	300	922	307	17	94	**551**
Cow peas, dry	50	69	138	900	1300	144	45	90	199

* In **bold** basic food crops with production growth faster than population growth for the fifty-year period as a whole.

belong to the successful food crops in Uganda during those fifty years. One crop has clearly lost its position: millet showed a doubling of its yield, but went from number two in terms of harvested area in 1961 down to number seven, remaining with only a third of the original acreage.

Since colonial times, Uganda has always been a country where crops have been cultivated for both local and (mainly) external markets, which did not belong to the basic food crops. In 1961, these were primarily fibres/oil crops (particularly cotton but also groundnuts and sesame) and coffee. In 2009 cotton had become far less important and groundnuts had stabilized but the area growing sesame, soy beans and sunflowers had increased significantly, while coffee and sugarcane areas had expanded as well and cocoa, sugarcane and tea had expanded very rapidly. The total area being used for agriculture had increased from 24% of Uganda's land area (199,710 km²) to 42%, giving the country ever more the appearance of a densely populated garden landscape. See Table 3.

Data on yields at crops level are difficult to find in Uganda; based on figures from the Ministry of Agriculture, Animal Industry and Fisheries Leliveld & ten Brummelhuis (2013) made Table 4, in which we can observe that only for cassava and rice the yield increased between 1970 and the 2000s. For cassava the yield (tons/hectares) quadrupled between 1987 and 2007. A main reason for this has been the introduction of a new plant variety which is resistant against the mosaic disease that has plagued Ugandan cassava growers for years. Rice yield significantly improved after the introduction of drought resistant rice varieties into Uganda. FAO data as presented later in this paper also suggest a major yield increase for maize, but this is not confirmed by data in Table 4.

Table 3: Uganda's crop groups: harvested area (x 1000 ha), 1961-2011

Crop	1961	2011	2011/1961
Cereals	992	1,702	x1.72
Pulses	268	1,190	x4.45
Roots/tubers	469	1,069	x2.28
Plantains	616	1,715	x2.78
Fibres	841	160	x0.19
Oil crops	1,197	1,300	x1.09
Fruits (excl. plantain)	56	148	x2.64
Vegetables	34	195	x5.83
Cocoa	1	51	x57.00
Coffee	245	320	x1.31
Sugarcane	17	40	x2.38
Tea	6	21	x3.82
Tobacco	12	20	x1.63
Total	*4,758*	*7,935*	*x1.67*
Basic food/Total*	*49%*	*72%*	

* This includes plantains for Uganda. Without plantains it would be 36% in 1961 and 50% in 2011.

Table 4: Uganda's average yields (tonnes/ha)

Crop	1970	1980	1985	1987	1992	1997	2002	2007
Plantains	7.73	4.85	5.34	5.53	5.35	6.04	6.00	5.50
Cassava	4.79	2.12	4.75	4.00	13.60	16.00	15.00	15.14
Sweet potatoes	3.53	27.18	22.14	19.68	7.50	4.90	5.33	3.83
Maize	1.29	1.77	1.66	1.68	1.44	0.83	0.87	0.87
Millet	1.13	1.64	1.60	1.59	1.60	1.27	1.48	1.67
Rice	-	1.71	1.86	1.75	2.60	2.68	4.27	4.01
Beans	0.49	0.59	0.79	0.80	0.75	0.35	0.70	0.49
Groundnuts	0.97	0.73	0.67	0.82	0.79	0.46	0.70	0.68

Source: Leliveld & ten Brummelhuis (2013)

Weak performance on yield increases can also be shown with figures from the 2000s, which show that adoption rates of new technologies among farmers are generally low, except for maize, beans, groundnuts and cassava: Table 5. Out of these four crops only maize and cassava have a substantial share in total agricultural production.

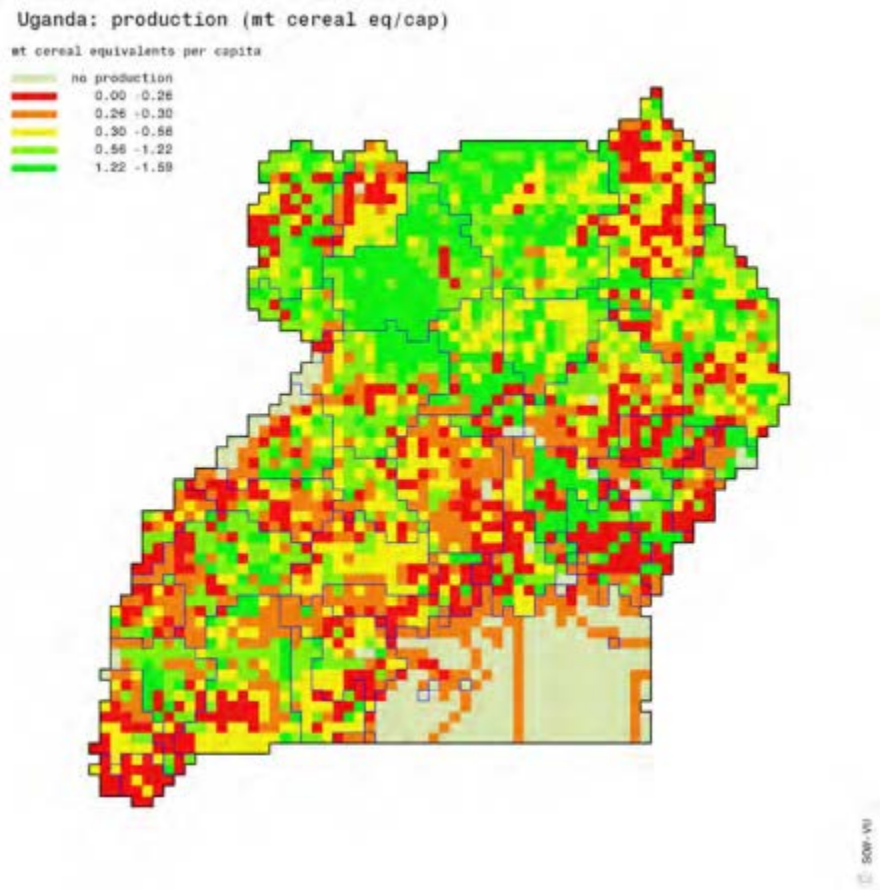
Table 5: Adoption of improved agricultural technology (% of households)

Crop	1999/2000	2007	Change (%)
Maize	17.4	50.1	32.7
Groundnuts	4.1	20.4	16.3
Beans	12.1	25.3	13.2
Cassava	9.4	22.2	12.8
Irish potatoes	1.7	4.3	2.6
Sweet potatoes	1.1	2.9	1.8
Bananas	5.2	6.9	1.7
Sorghum	1.1	2.2	1.1
Rice	3.0	3.2	0.2
Simsim	1.2	0.7	-0.5
Coffee	4.8	1.8	-3.0
Millet	3.5	0.4	-3.1
Cotton	40.9	1.8	-39.1

Source: Bashaasha, Bernard. 1998. Public Policy and Rural Land Use in Uganda. Ph.D., Department of Agricultural, Environmental and Development Economics, Ohio State University, Columbus, OH

Geographically food production per capita differs considerably in Uganda, as is shown in Figure 6.

Figure 6: Uganda's food production (ca 2005)



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.

Livestock and fisheries

With the exception of its pig and chicken population, Uganda's livestock numbers grew at considerably lower levels than its very high population growth numbers and, as a result, the total tropical livestock units per capita had decreased by 2011 to below half those for 1961. Although every decade showed overall growth in total TLU (Total Livestock Units) figures, the numbers for sheep and goats were erratic, and overall livestock growth figures were quite low between 1961 and 1990. Since 1990 there have been signs of faster growth but it is still below the country's extremely high population growth figures. See Table 6a.

Table 6a: Uganda's livestock (x million), 1961-2011

Year	1961	1970	1980	1990	2000	2011	2011/1961 index
Human population (millions)	7.0	9.4	12.7	17.7	24.2	34.5	492
Cattle	3.6	4.3	4.8	4.9	6.0	8.1	224
Sheep	0.9	0.8	1.3	0.8	1.1	1.9	220
Goats	2.6	1.8	2.5	4.7	6.4	9.3	357
Pigs	0.0	0.1	0.2	1.2	1.6	2.4	**14858**
Total	7.1	7.0	8.8	11.6	15.1	21.6	305
Chickens	7.0	8.0	13.0	19.0	26.4	34.7	**533**
*Total TLU**	*3.0*	*3.4*	*3.9*	*4.3*	*5.4*	*7.4*	*250*
TLU/cap	*0.43*	*0.33*	*0.31*	*0.24*	*0.22*	*0.21*	*51*

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

The production from inland fisheries in Uganda had quadrupled by the 1990s, then stagnated after an embargo on fish exports imposed by the European Union, and picked up strongly in the past decade again, after the embargo was lifted. As a result, the average amount per capita has almost doubled since 1961 (see table 6b).

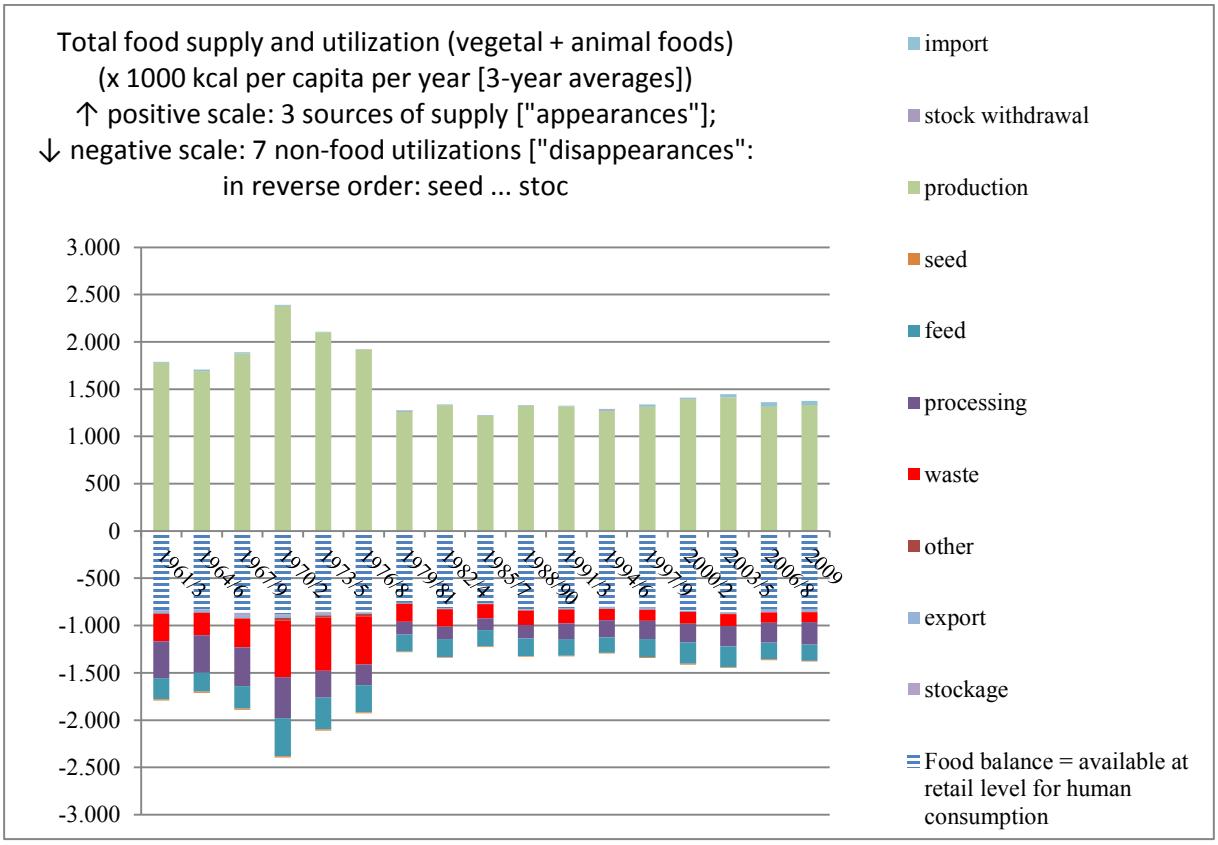
Table 6b: Uganda's fisheries (x 1000 tonnes), 1961-2011

Year	1961	1970	1980	1990	2000	2011	2011/1961 index
Freshwater fishes	61.2	129.0	165.8	245.3	220.2	523.1	855
Miscellaneous aquatic animals	-	-	-	-	0.5	-	-
kg/capita	8.7	13.7	13.1	13.9	9.1	15.2	173

3 Uganda's food balance 1961-2010

Food production and food consumption are connected, but not the same. FAO's food balance data show that food production, imports and stock withdrawal are one side of food availability, but seeds, feed, processing, waste, export and stockage all deduce food available for direct consumption at retail level. Feed and processing can mean indirect food availability, but this can also be (partly) exported. The food production data per capita show the same picture as we have in section 1 (there we looked at all basic foods [from vegetable origin], here at all vegetal and animal foods): improvements to a relatively high level in the early 1970s; drastic deterioration until the mid-1980s and stabilization afterwards, at levels much below the early 1970s, but still considerably above minimum food requirements. Food imports have always been minimal. However, direct food availability at retail level has always been much lower than food production figures in Uganda. In the 1960s and 1970s feed, processing and other uses including waste were relatively high in Uganda. Dietary energy available for human consumption at retail level has been fluctuating, but did not improve since the 1960s and is only slightly above minimum standards; there is even a slightly downward trend in the past decade (see the food balance in Figure 7 [first bar below the zero line, expressed in 1000 kcal per capita per year] and in Figure 8 [now in positive scale, expressed in kcal per capita per day]). In Figure 9 we show the contributions of the four main basic food categories to the availability at retail level. That the contribution of cereals and

Figure 7: Uganda's annual food balance, 1961-2009



Notes: see next page

Notes for reading Figure 7:

- The positive scale shows sources of food supply (production + withdrawal from stocks + import).
- The negative scale shows 7 'disappearances' into utilizations other than human consumption (putting into stocks + export + other + waste + processing + feed + seed).
- The amount remaining (shaded part: the 'food balance') is an indirect estimate of food available at retail level for human consumption.
- The disappearance factors are positive amounts, but in this graph they are represented on the negative scale, adding up (with the 'food balance') to exactly the same total as the food supply on the positive scale.
- Note: that the legend of the graph shows the utilizations in reverse order is due to a technical constraint in constructing this 'mirror imaged' stacked bargraph.

roots and tubers is less than one might expect on the basis of Table 2, can be explained: quite a lot of roots and tubers, but also part of the cereal harvests are being used as livestock feed. Availability of quality foods rich in essential nutrients (fruits, vegetables, nuts, oils and fats and foods of animal origin) deteriorated in the 1970s, and picks up slowly since the late 1980s, and has risen slightly above 1961 levels by now (see Figure 10).

Figure 8: Uganda: food available for human consumption: composition of the food basket at retail level, 1961-2009

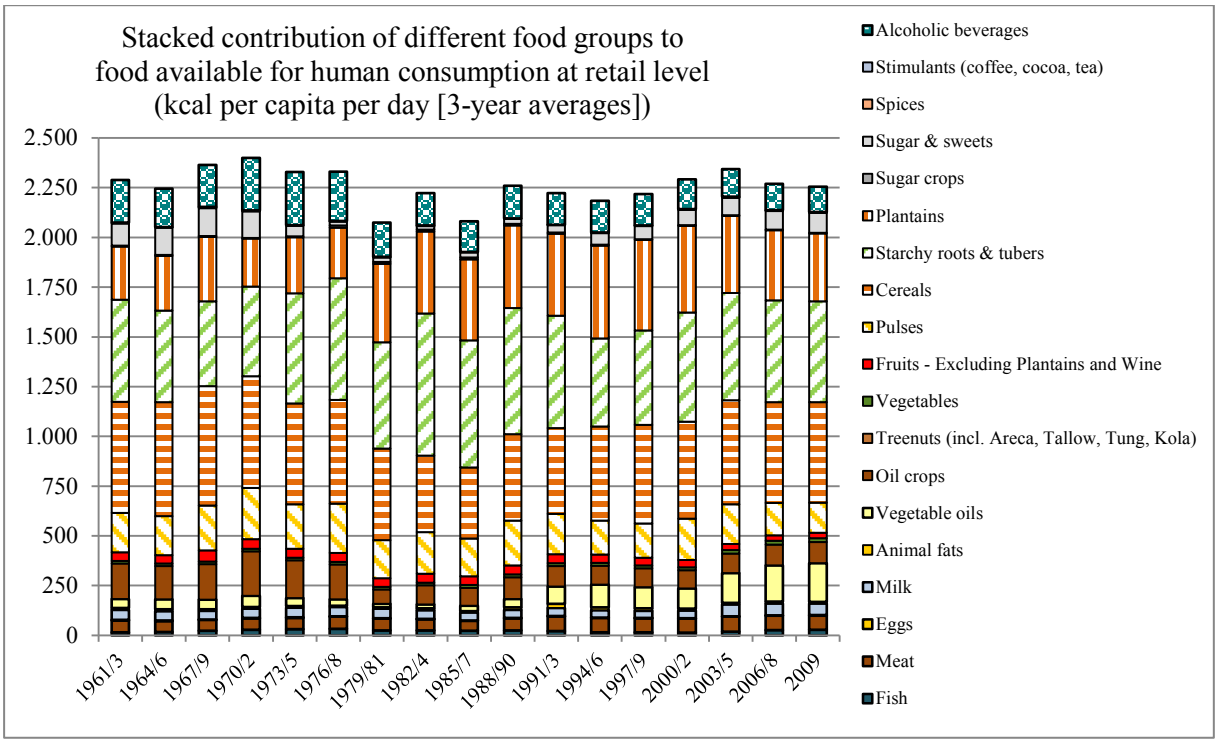


Figure 9: Uganda: basic food contribution to the diet, 1961-2009

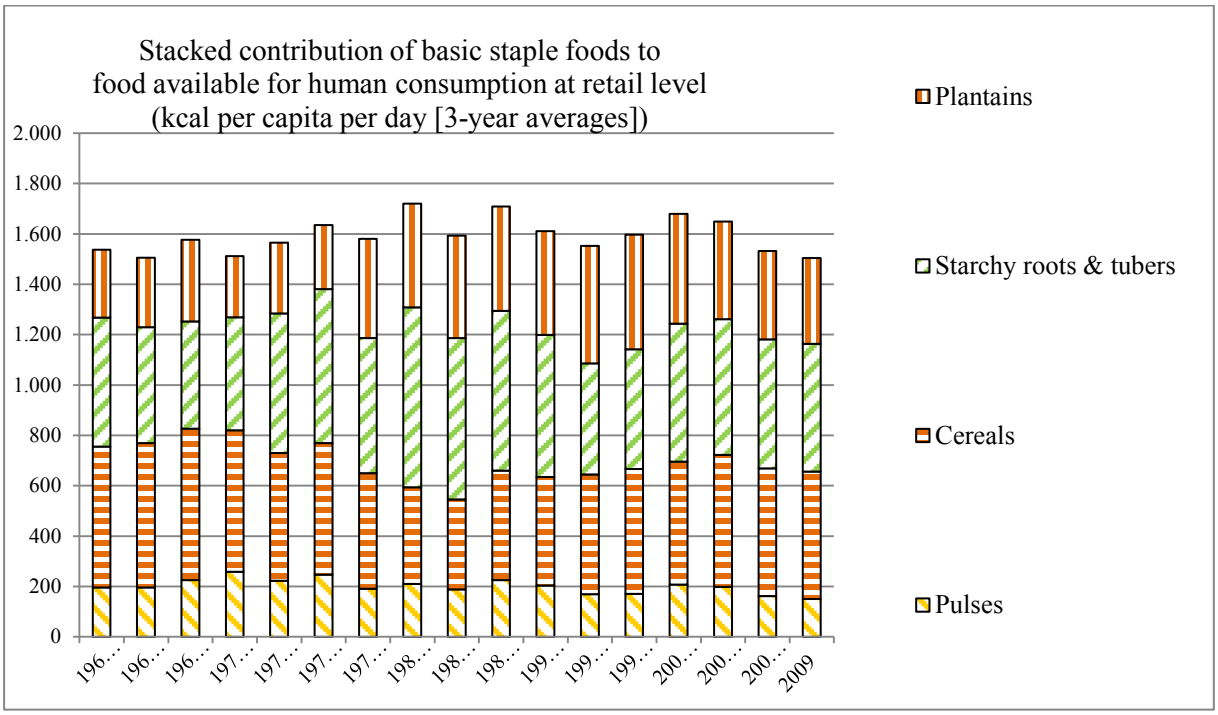
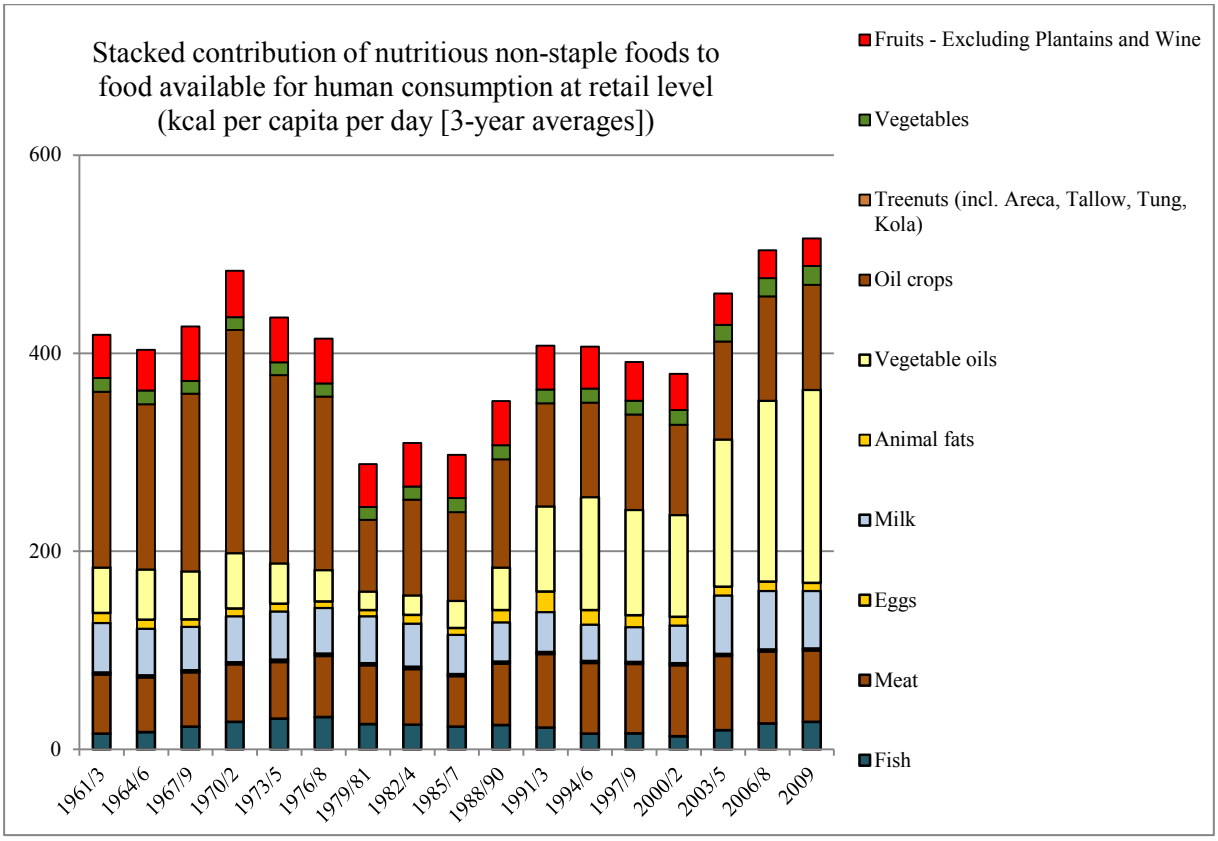


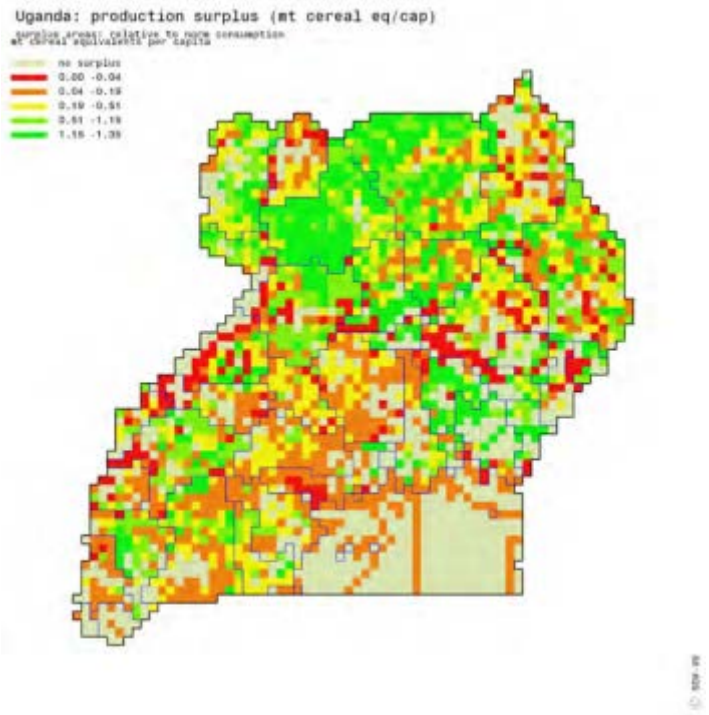
Figure 10: Uganda: Dietary diversity: contribution of nutritious non-staple foods to the diet, 1961-2009



Note: This and the previous displays are in terms of dietary energy, not food weight and not nutrient content. Foods that contain a lot of water and little fat (such as fruits and vegetables) contribute less energy for their weight. Their contribution to protein, vitamin and mineral intake is considerably higher than their share in this graph

Figure 11 presents an assessment of Uganda's food surplus areas, adding geographical specificity to the production part of the food balance data.

Figure 11: Uganda's food surplus areas, ca 2005



Source: Van Wesenbeeck, C.F.A. and M.D. Merbis (2012) Africa in Maps, data repository of the food economy in Sub-Saharan Africa. Amsterdam: Centre for World Food Studies

4 Uganda's most successful agricultural products, 2000-2010

If we look at Uganda's crop production between 2000 (three-year averages for 1999-2001) and 2010 (three-year averages for 2009-2011) we can see major differences in agricultural successes. Tables 7a and 7b show the data for crops and livestock and Table 8 shows a matrix with production growth and yield improvements for crops and additional information about livestock dynamics. Within each cell the crops are presented in the order of magnitude of harvested area around 2010. The cell in the right hand upper corner shows 'promising crops': with total production growth faster than population growth for the decade (38%) and at the same time yield increases of more than 20%. For Uganda these are not unimportant crops: maize, sesame, seed cotton, rice and cow peas are crops with a relatively high number of hectares. Oilseeds are a relatively minor crop. However, this success is not so evident according to figures from other sources, presented earlier and below, whereby particularly yield figures on maize can be seriously questioned (large discrepancies between FAO and 'local' figures).

Table 7a: Performance of Uganda's major crops 2000-2010 (> 35,000 ha in 2010) (population growth 2000-2010: 38%)

Crop (per category highest acreage first) Green: Promising crop Red: Problem crop	Ha in 2010 (x 1000)	Production [index number of 2010 compared to 2000] Green >138 Red <100	Yield [index number of 2010 compared to 2000] Green >138 Turquoise >120<138 Red < 100	Area [index number of 2010 compared to 2000] Green >138 Turquoise >120<138 Red < 100
Plantains	1,699	102	96	106
Maize	1,012	219	136	161
Beans, dry	953	102	75	136
Sweet potatoes	587	112	106	106
Cassava	417	101	94	107
Groundnuts, with shell	391	204	105	194
Sorghum	353	100	79	127
Coffee, green	303	93	85	108
Sesame seed	301	198	128	155
Sunflower seed	208	319	118	272
Vegetables primary	194	169	81	209
Millet	177	47	102	46
Soybeans	150	154	108	142
Bananas	142	96	92	105
Vegetables fresh nes	129	180	79	226
Potatoes	105	151	98	154
Seed cotton	103	139	335	41
Pigeon peas	97	118	96	124
Rice, paddy	88	207	170	122
Cow peas, dry	71	145	131	111
Onions, dry	61	134	75	178
Oilseeds, Nes	48	157	136	115
Cocoa beans	46	401	119	338
Sugar cane	42	182	85	213

Source: FAOSTAT | © FAO Statistics Division 2013 - Updated: 08 August 2013, Accessed on 17 September 2013 (http://faostat.fao.org/site/567/)

Together these 'most successful crops' represented 21% of Uganda's harvested crop area in 2010, of which maize takes about 63%.

There is another reason why these crops should not immediately be presented as 'miracle' crops. The successful crops further identified below (cotton, rice, maize, cow peas, and oil-seeds) are partly also crops that experienced a 'peace' dividend. Maize, cotton, and cowpeas, and rice and oil seeds to some lesser extent are all crops that are cultivated and / or dominant in crop and food patterns in the north of Uganda. After the ceasefire in 2006 and the with-drawal from the LRA from north Uganda, massive return of internally displaced people to their land has caused a major increase in national production figures on these crops. This also applies to goats, which are a first more affordable kind of livestock (and savings account) than more expensive cows.

Some livestock species show remarkable growth figures during the last decade: sheep, and pigs particularly, together 16% of the total tropical livestock units present in the country in 2010. More and more cattle were kept as dairy cows, with a concomitant production increase. Fresh water fish production more than doubled in the past decade. Uganda's 'problem crops' (with both negative production and yield trends between 2000 and 2010; coffee, and bananas) only represented 2% of the harvested area in 2010. There were no 'problem livestock species'.

Table 7b: Performance of Uganda's major animals 2000-2010
(population growth 2000-2010: 38%)

Product/Type of animal Green: Promising species Red: Problem species	Number of animals producing or slaughtered in 2010 (x 1000)	Production [index number of 2010 compared to 2000] Green >138 Turquoise: >120<138 Red <100	Weight of milk/meat/eggs per animal [index number of 2010 compared to 2000] Green >138 Turquoise: >120<138 Red < 100	Offtake (% of animals producing or slaughtered out of total stock) [index number of 2010 compared to 2000] Green >138 Turquoise: >120<138 Red <100	Head count [index number of 2010 compared to 2000] Green >138 Turquoise: >120<138 Red < 100
Cow's milk	3,367	229	100	176	130
Hen eggs	4,733	114	104	86	127
Chicken meat	45,167	135	100	106	127
Goat meat	2,750	131	98	96	140
Sheep meat	648	168	100	100	168
Pig meat	1,895	146	100	100	146
Cattle meat	863	132	100	101	130

NB. The index number of total production is the multiplication of the index for head count times the 2 indices for 'yield' (offtake and weight per animal)
Source: FAOSTAT | © FAO Statistics Division 2013 - Updated: 08 August 2013, Accessed on 19 September 2013 (http://faostat.fao.org/site/636)

Table 8: Uganda: successful and less successful crops and livestock species, 2000-2010*

Crops and livestock Yield increases 2000-2010		Production increases 2000-2010		
		<100%	100-138%	>138%
	>138% >120%			**Cotton** **Rice** **Milk** **Maize** **Sesame** **Cow peas** **Oilseeds**
	100-120%	Millet	Sweet potatoes Chicken (meat) Cows (meat)	Groundnuts Sunflower Soybeans Cocoa Sugar cane Pigs Sheep Fish[1]
	< 100%	Coffee Bananas	Plantains Dry beans Cassava Sorghum Pigeon peas Onions Eggs Goats	Vegetables, total Vegetables, nes Irish potatoes

nes = not elsewhere specified

* In **bold**: most successful crops and livestock species.

[1] For fish no information is available that can be taken as an index of 'yield'.

As we are dealing with agro-food products we will neglect cotton. The other most successful crops and livestock species are highly relevant for food security though. For those we will give dynamic data for the period as a whole: Figure 12a for rice, 12b for maize, 12c for cow peas and 12d for sesame. For the livestock sector we regard pigs and sheep as the most successful species, but only on the basis of the expansion of numbers. It would also be interesting to look at Uganda's dairy industry, given its importance also for the milk processing industry and milk consumption in Uganda. See figures 12e-g.

Figure 12a: Rice as a recently successful crop in Uganda: production dynamics 1961-2011

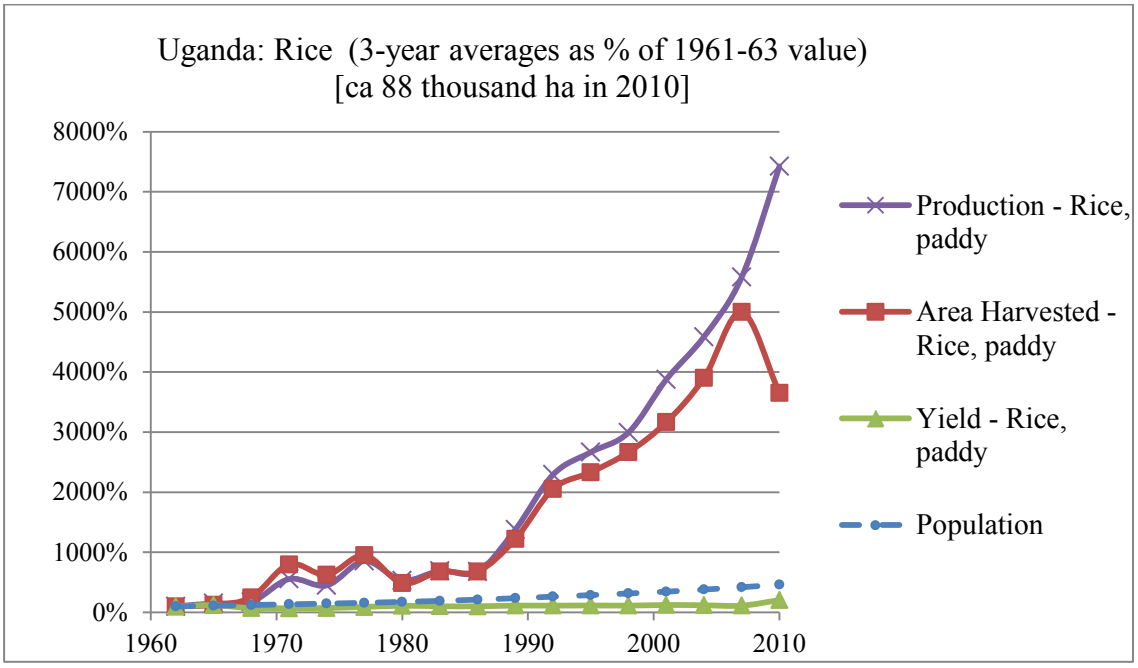


Figure 12b: Maize as a recently successful crop in Uganda: production dynamics 1961-2011

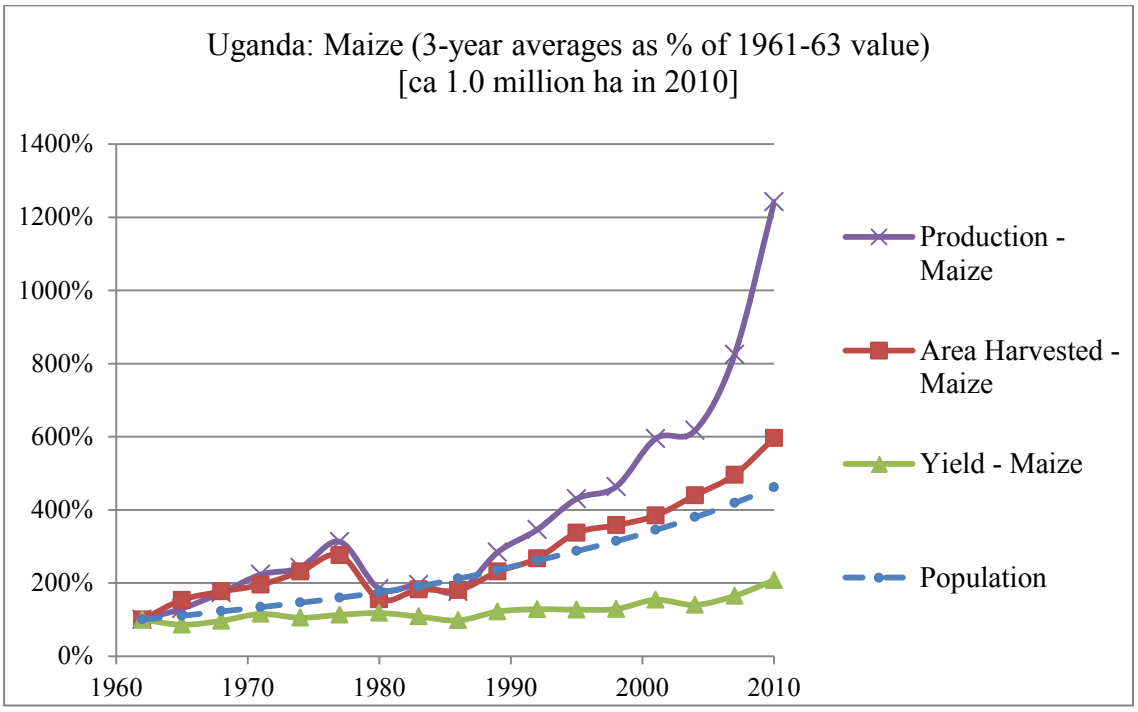


Figure 12c: Cowpeas as a recently successful crop in Uganda: production dynamics 1961-2011

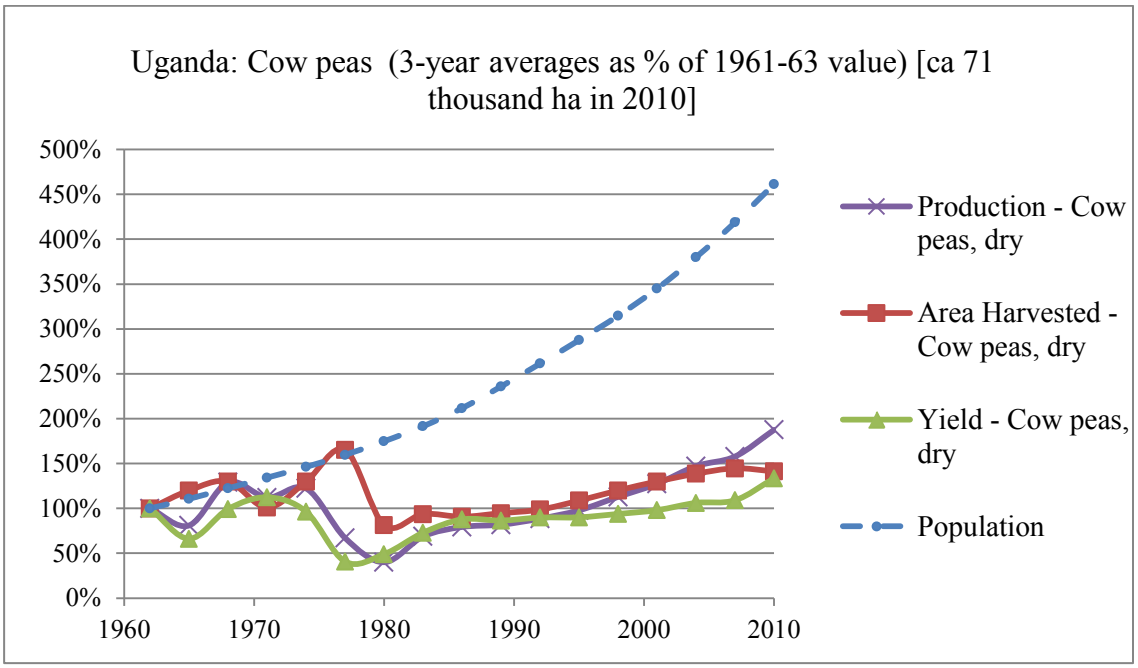


Figure 12d: Sesame as a recently successful crop in Uganda: production dynamics 1961-2011

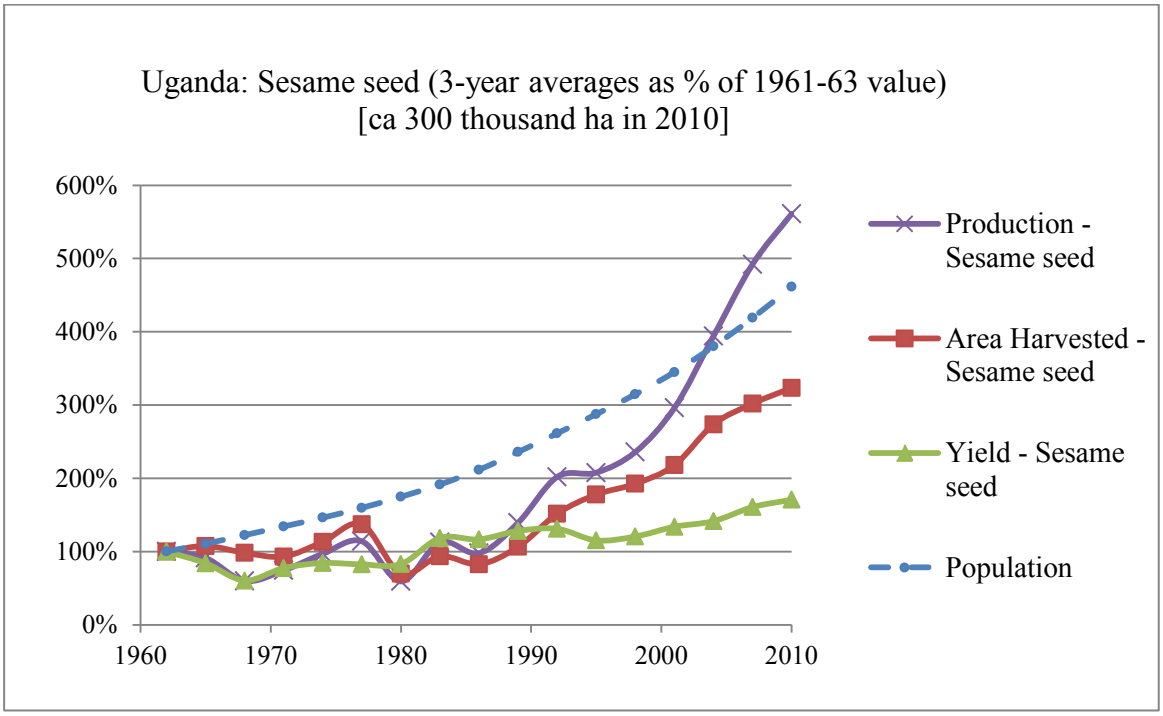
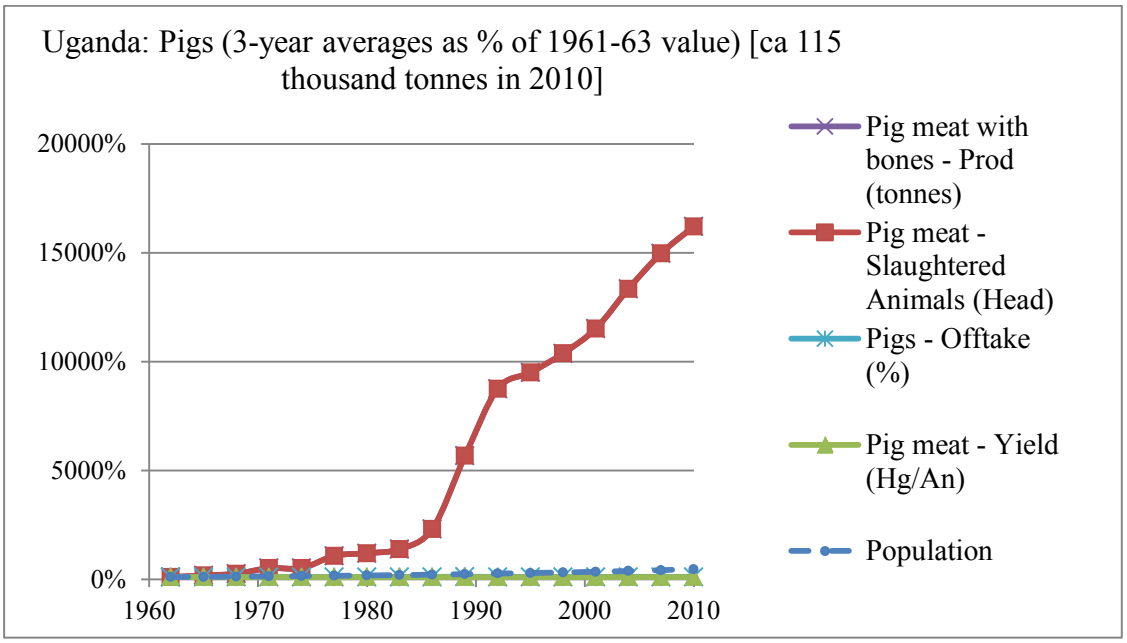


Figure 12e: Pigs as a recently successful livestock species in Uganda: production dynamics 1961-2011



As a result of the enormous (recorded) growth in slaughter figures the figure is not very informative. The following graph zooms in on the subset of 'yield' factors and shows a strong peak in pig slaughtering in the late 1970s and again the late 1980s:

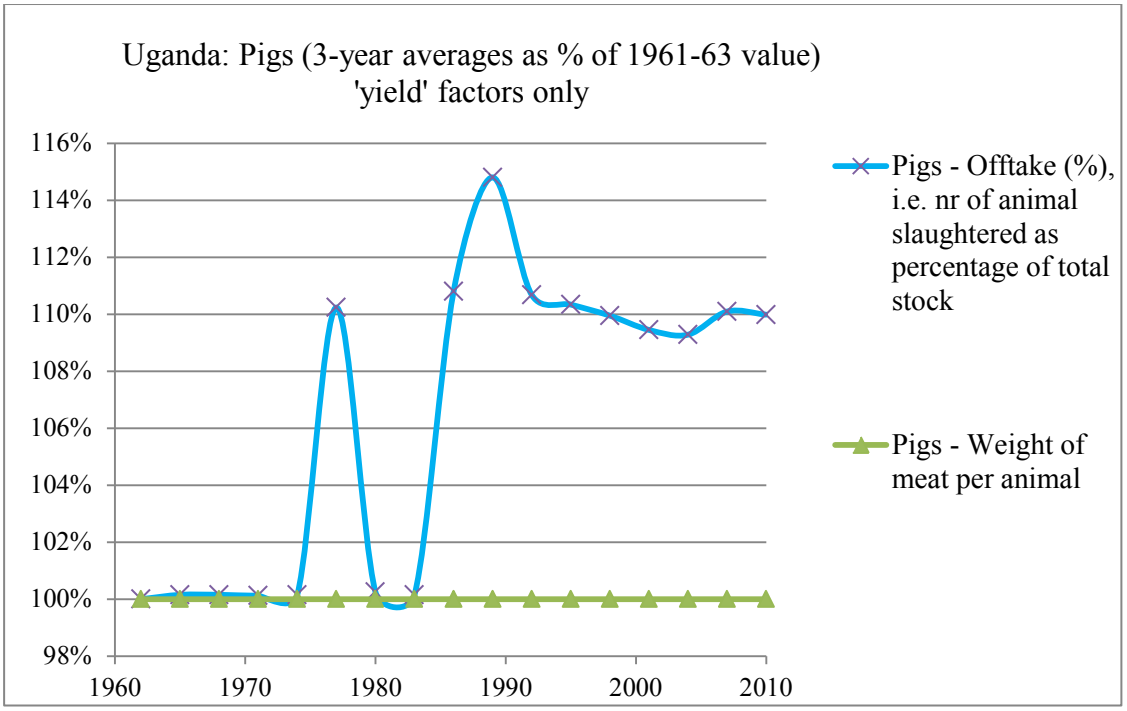


Figure 12f: Sheep as a recently successful livestock species in Uganda: production dynamics 1961-2011

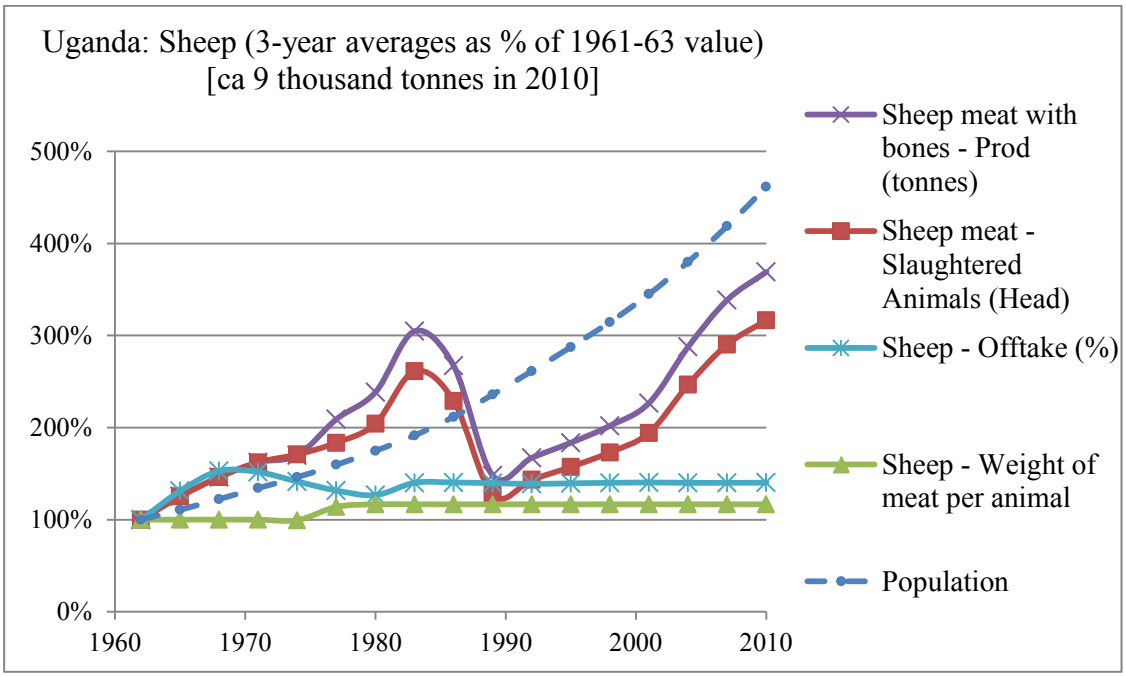
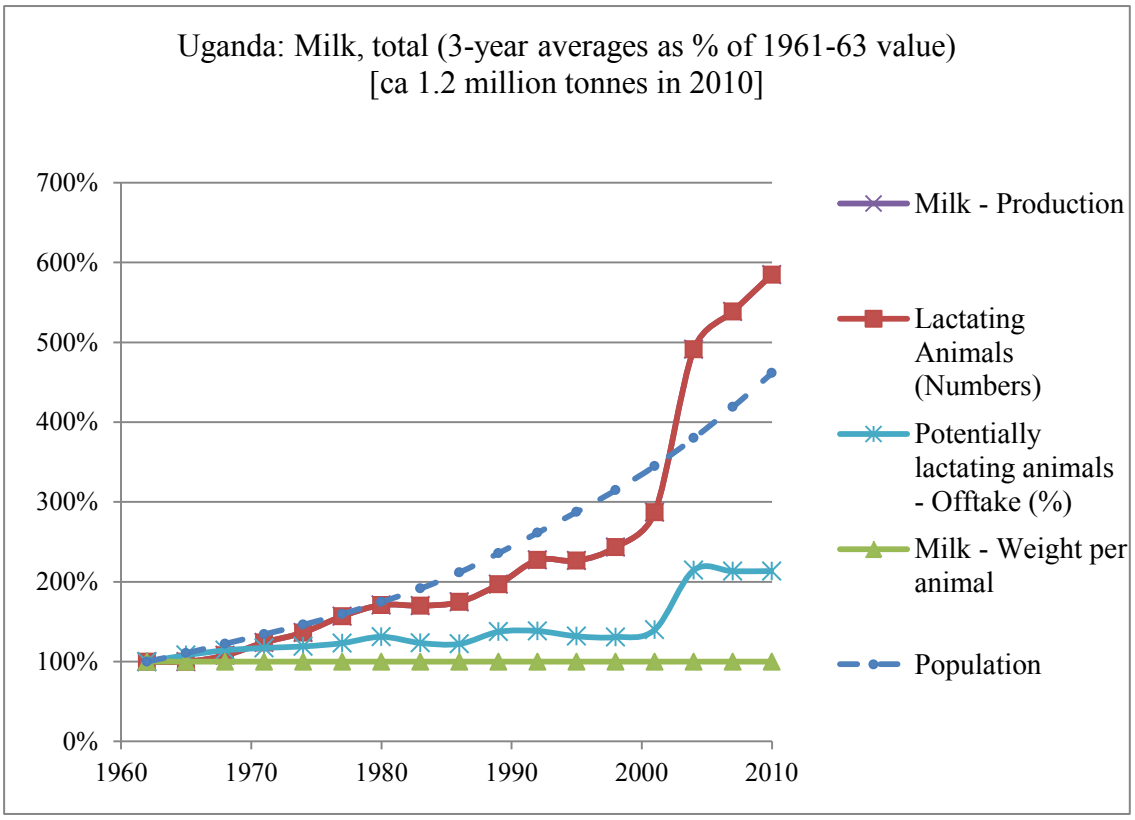


Figure 12g: Dairy milk as a recently successful livestock product in Uganda: production dynamics 1961-2011



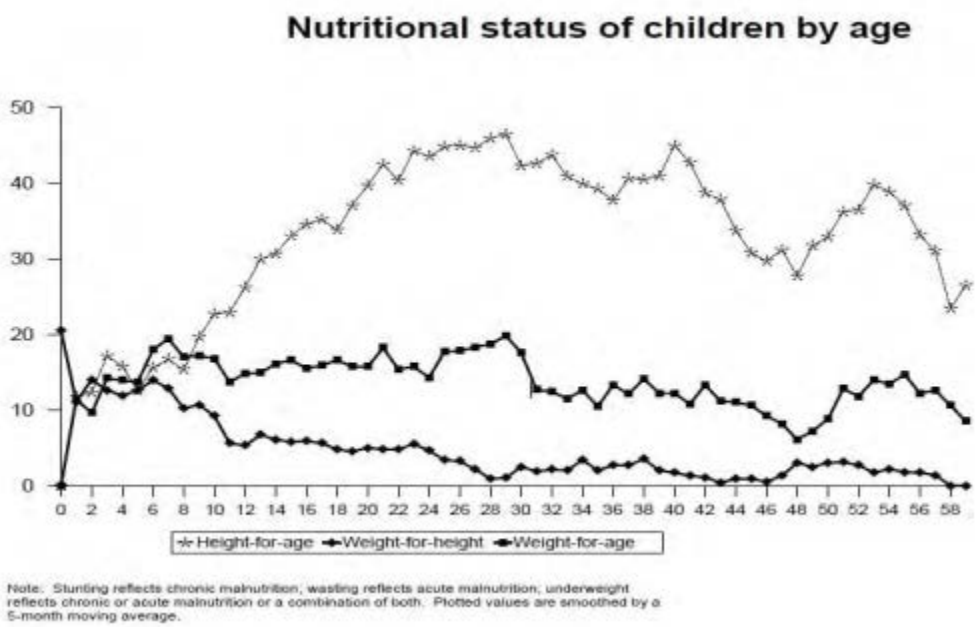
5 Uganda's food security as indicated by child under-nutrition data

In Uganda there have been Demographic and Health Surveys in 2000/01, 2006 and 2011. These give an indication of child under-nutrition and hence of actual food insecurity. The prevalence of low weight-for-height (wasting, thinness) is a measure of acute under-nutrition and is generally highest among the youngest (most vulnerable) babies; the prevalence of low height-for-age (stunting, shortness) is a measure of chronic under-nutrition, reflecting the accumulation of effects as age progresses: in general it is an irreversible condition that impacts negatively on health and performance once the child has reached adult life. The combined result of wasting and stunting is reflected in the overall indicator: prevalence of underweight (see Figure 13a): it accumulates, but less so than stunting. Therefore, stunting is now regarded as the indicator of choice of nutrition insecurity. The following graphs (Figure 13b-18), give a simultaneous view on the condition of wasting and stunting; the prevalence of underweight (not shown) increases from bottom left to top right in these figures. The closer a data point is to the origin (zero-point), the better is the nutritional condition. The graphs show reference values for severity, as follows: prevalences of stunting are qualified as a 'serious problem' of public health significance if they are between 30 and 40% and 'very serious' if they are beyond 40%. For wasting these critical levels are lower (10% and 15%, respectively), due to its nature as generally a temporary episode in a young child's life.

The DHS 2011 results show that acute under-nutrition in Uganda is high in the first two years of a child's life and chronic under-nutrition accumulates with age (see Figure 13). Under-five boys are more under-nourished than under-five girls (Figure 14). Rural under-fives are considerably (almost 2 times) more undernourished than urban under-fives (Figure 15), and there are very dramatic differences between regions, with North-eastern Karamoja by far the worst area (Figure 16). Under-fives growing up in poorer households have higher child under-nutrition percentages (both the acute and the chronic form; Figure 17)[3]. The trend in nutritional status of under-fives in Uganda seems to be improving somewhat: a steady decrease of chronic under-nutrition (stunting) during the last decade and first an increase in underweight (wasting) and then a decrease to levels slightly below those in 2000 (Figure 18). Compared to many other African countries, Uganda's child under-nutrition is not serious with regard to 'wasting' (on average below five percent of all under-fives currently have a serious weight-for-height problem, but it is for 'stunting' (on average more than 30% of all under-fives were reported to have a serious height-for-age problem.

[3] Note: there appear to be unexplained erratic results among the lower quintile groups (less stunting than expected if the relationship with wealth would be gradual).

Figure 13a: Uganda: children's under-nutrition in 2011, by age



Source: Fig 11.1 in Uganda Bureau of Statistics (UBOS) and ICF International Inc. 2012. Uganda Demographic and Health Survey 2011. Kampala, Uganda: UBOS and Calverton, Maryland: ICF International Inc.

Figure 13b: Uganda: children's under-nutrition in 2011, by age groups

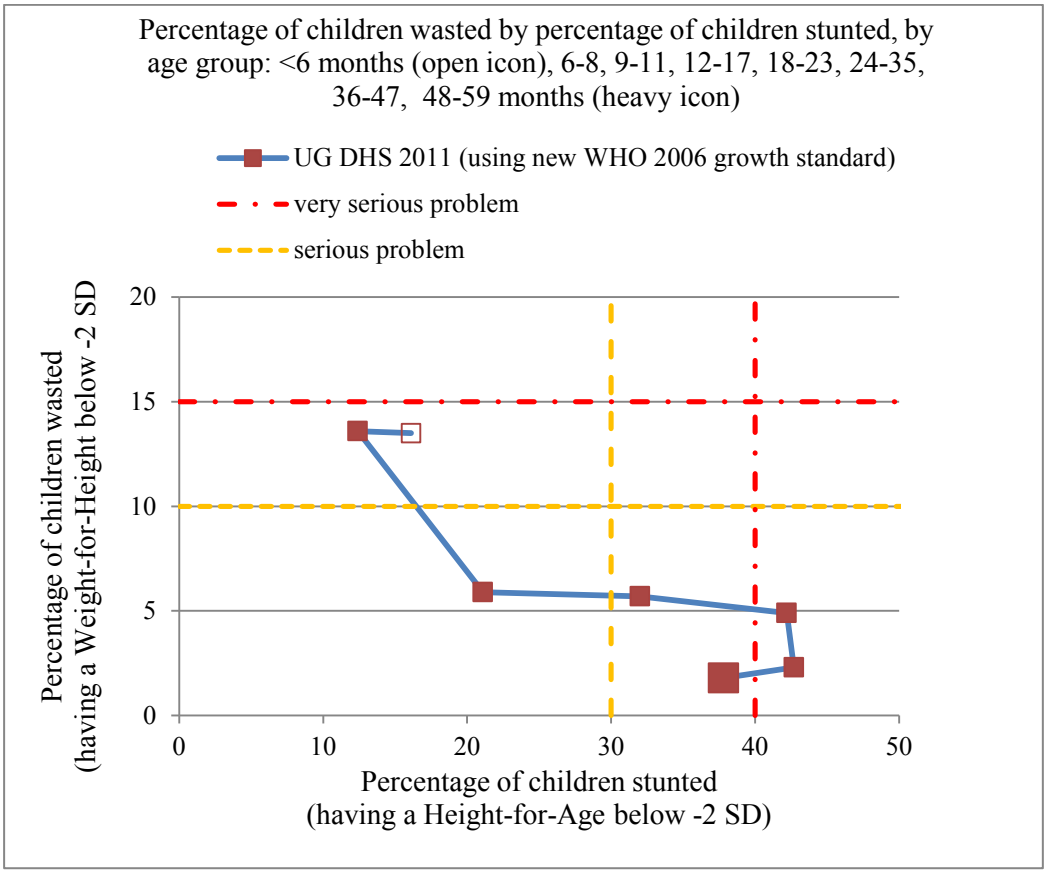


Figure 14: Uganda 2011: under-nutrition, differences between boys and girls

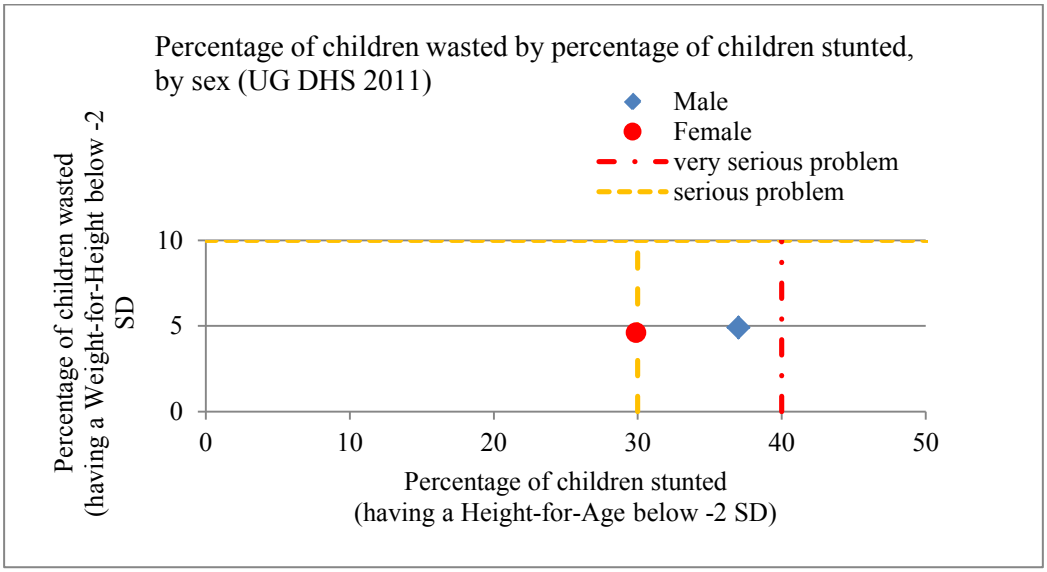


Figure 15: Uganda 2011: under-nutrition differences between rural and urban areas

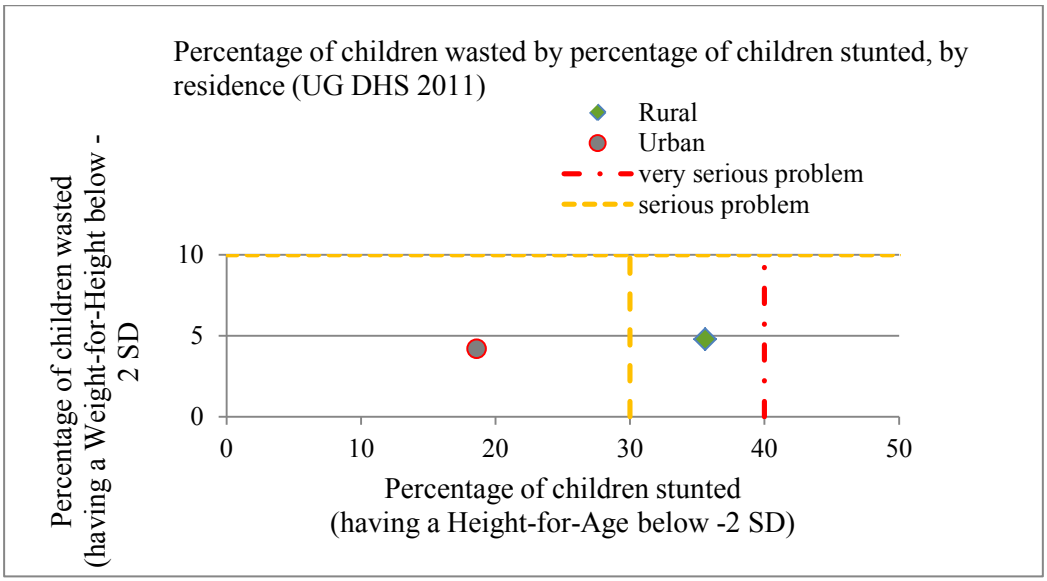


Figure 16: Uganda 2011: under-nutrition differences between regions

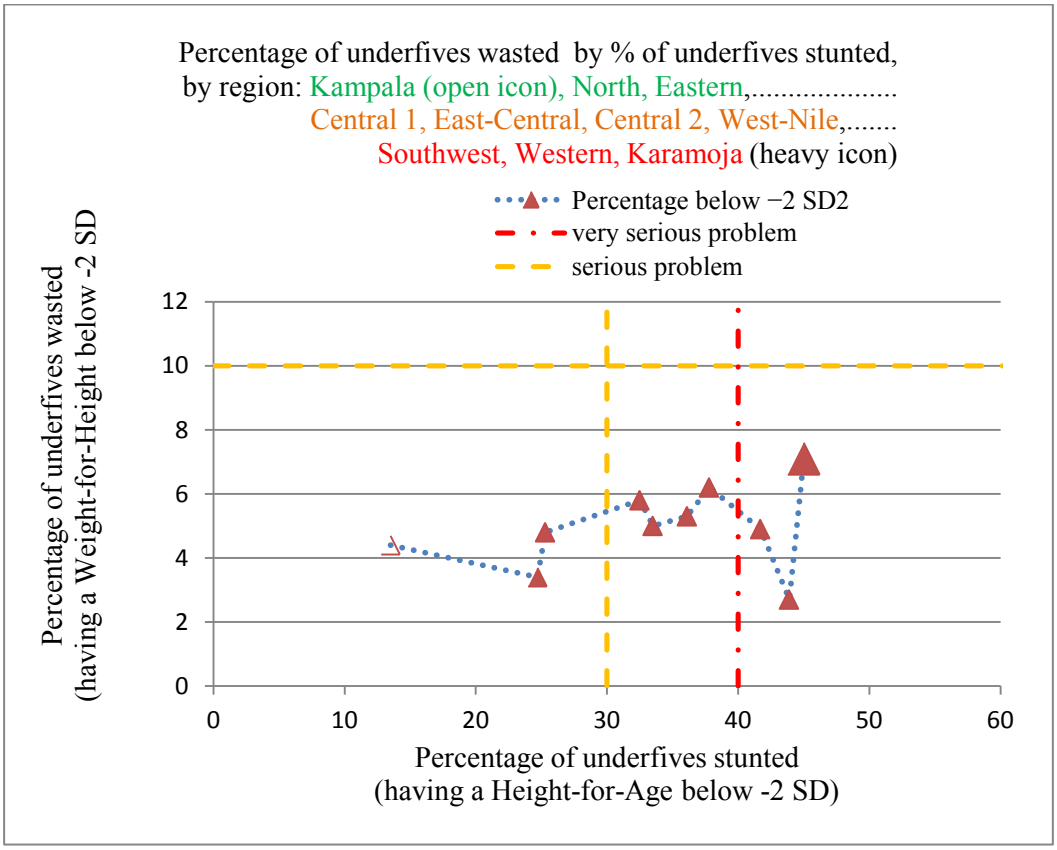


Figure 17: Uganda: under-nutrition by wealth group (income quintiles)

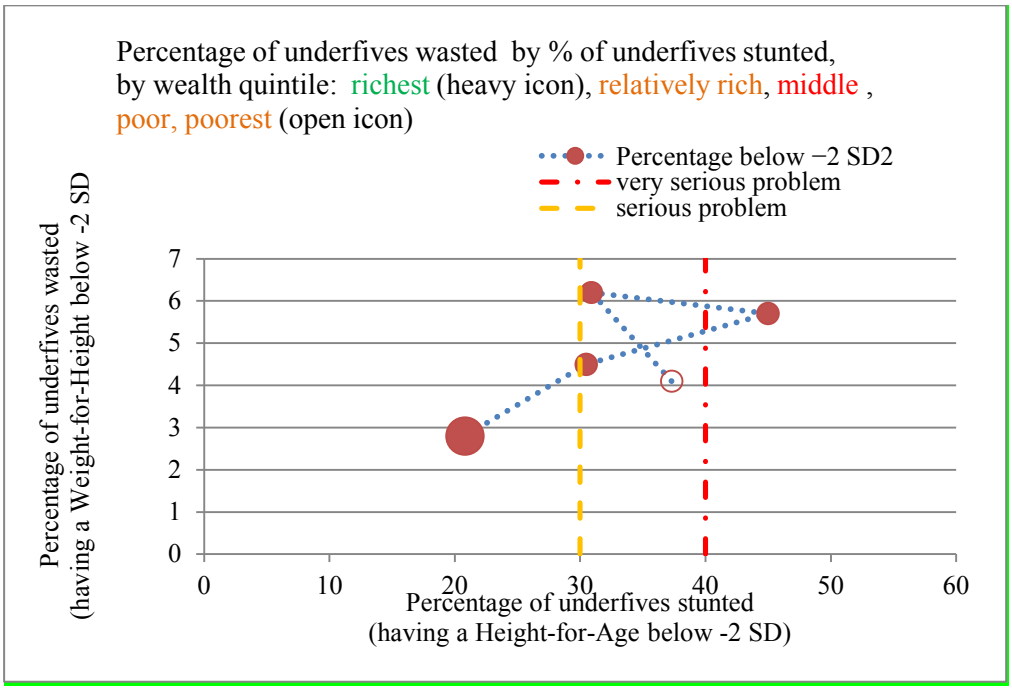
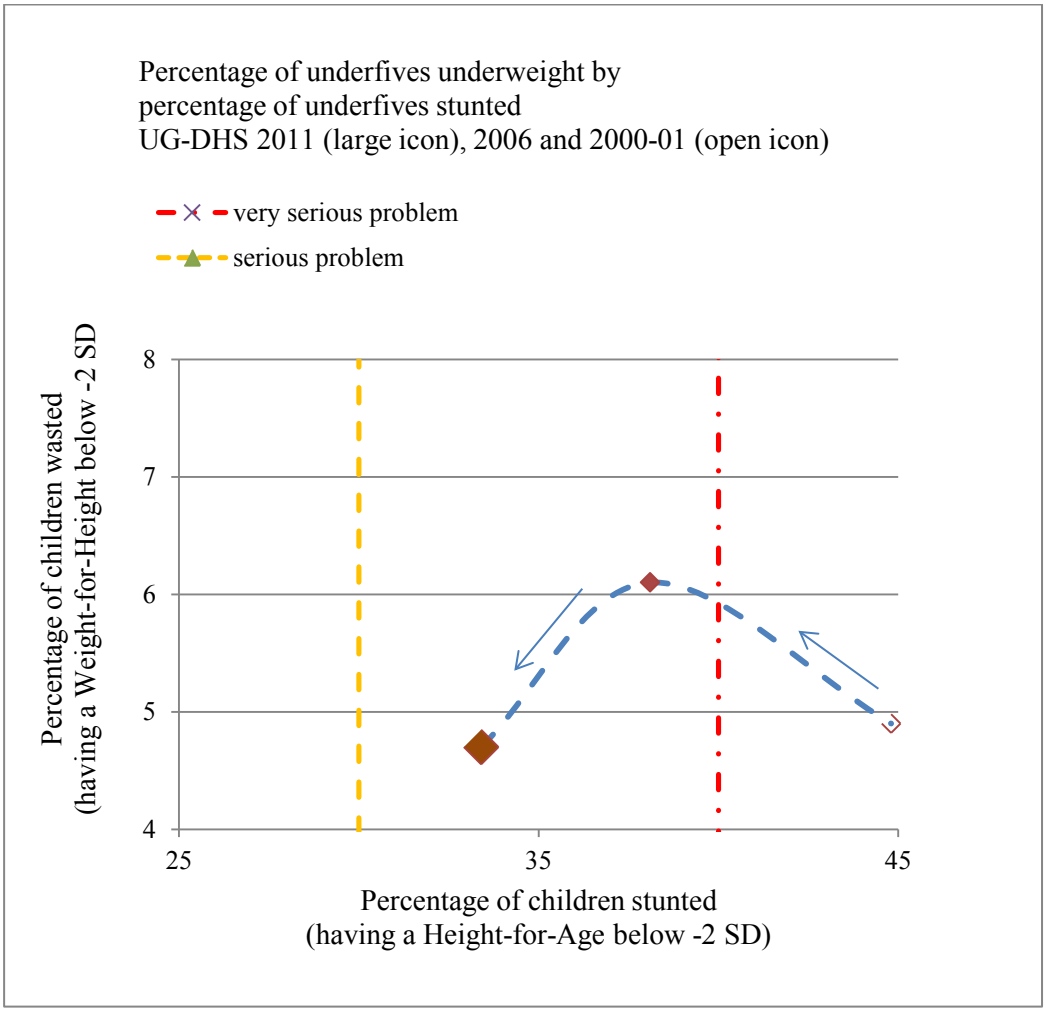
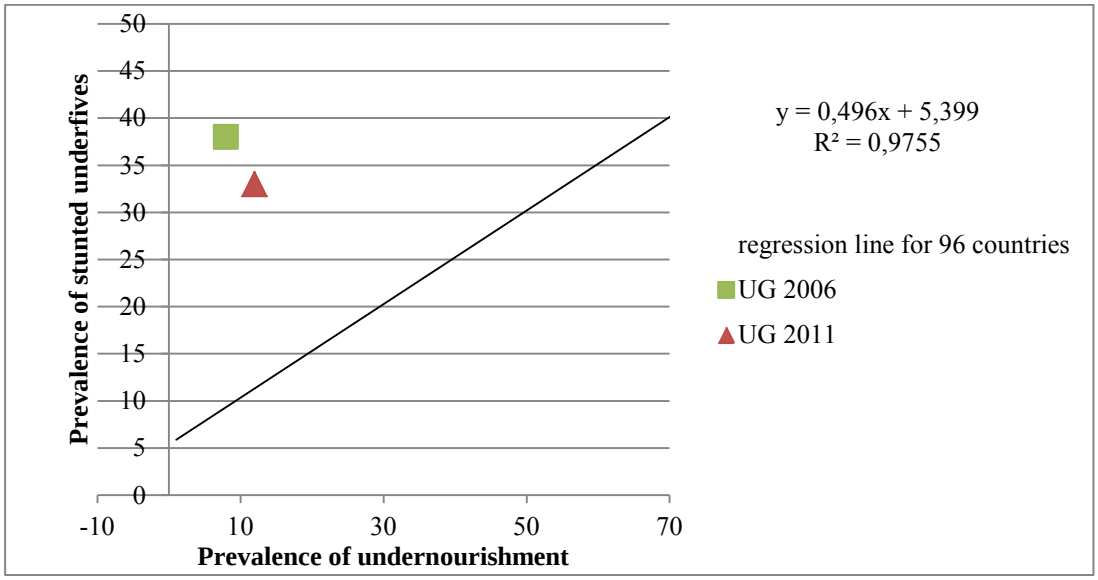


Figure 18: Uganda: under-nutrition dynamics 2000-2006-2011



The Food and Agriculture Organization produces an alternative hunger estimate ('Prevalence of Undernourishment', PoU) based on (i) average aggregate food availability (as per the annual Food Balance Sheets) and (ii) a statistical procedure, based on budget-consumption survey data, to generate a fictitious 'distribution' of that food over income classes. The PoU is an estimate of the number of people (all ages combined) that are chronically hungry in the country in a given year. Figure 19 indicates the position of Uganda of the two indicators on a background canvas of an international analysis based on 96 countries. The graph shows that for a prevalence of undernourishment of 12% (which is the current Ugandan figure), the international regression line would predict a prevalence of stunting of about 11%. Instead, in Uganda the prevalence of stunting among under-fives is almost three times as high as predicted (38% and 33% according to the DHS anthropometric surveys of 2006 and 2011, respectively). The time trend is also contrary: a recent decrease in child undernutrition with an increase in the hunger estimate.

Figure 19: Position of Uganda in the international relationship between the percentage of children who are stunted and the prevalence of people who are undernourished



Source: Analysis of 96 countries in FAO's The State of Food Insecurity in the World 2013

The areas of under-nutrition and severe under-nutrition also appear on Ugandan maps, as produced by the Centre for World Food Studies in Amsterdam. See Figures 20a/b and 21a/b.

Figure 20a/b: Undernourished and severely undernourished areas in Uganda

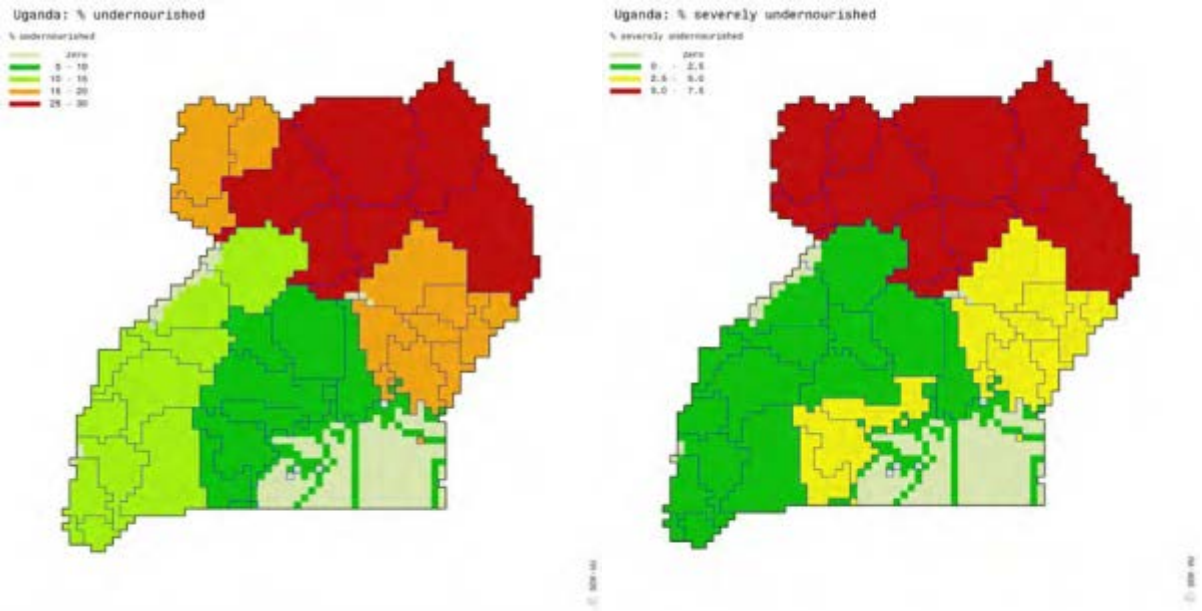
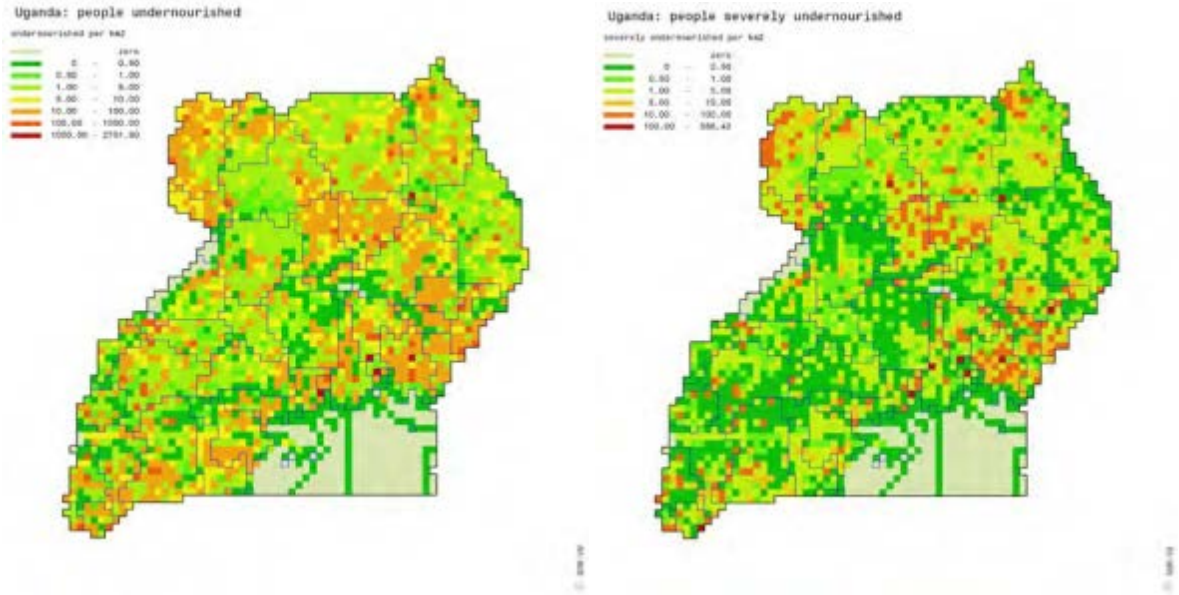


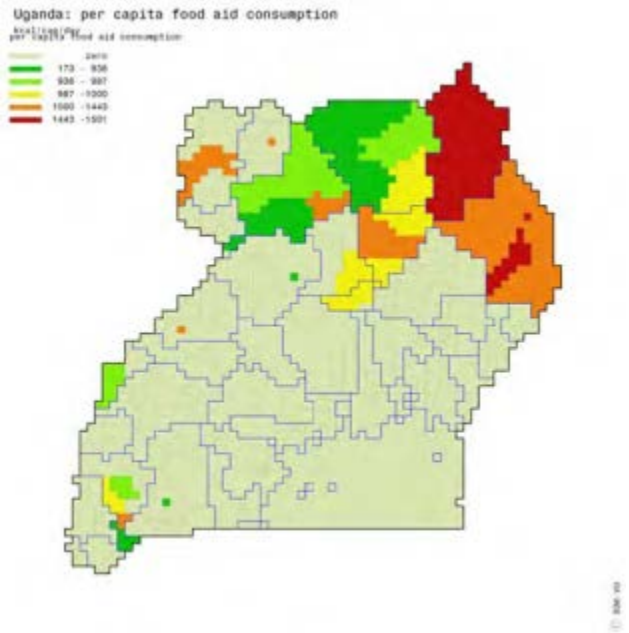
Figure 21a/b: Number of people undernourished and severely undernourished in Uganda



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012) Africa in Maps, data repository of the food economy in Sub-Saharan Africa. Amsterdam: Centre for World Food Studies

Food aid has become a standard element of food provisioning in some of these regions in Uganda, particularly in the Northeast. Figure 22 gives some details.

Figure 22: Food aid in Uganda: regional distribution of per capita food aid



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012) Africa in Maps, data repository of the food economy in Sub-Saharan Africa. Amsterdam: Centre for World Food Studies

6 DRA/ASC-AFCA research questions for Uganda

On average, Uganda could and mostly did easily feed its population with its own agricultural produce. Despite its very rapid population growth, and even during the regimes of Idi Amin and Milton Obote II (1971-1985), food production and food balance figures show adequate food sufficiency and food security. Child under-nutrition figures do not show a serious problem in terms of chronic food insecurity, but the height-for-age figures show problems with food quality and hence the composition of children's diets, particularly for children between one-and-a-half and three years old, males, in rural areas, in Karamoja, Southwestern and Western Regions, and belonging to households in the poor and very poor quintiles of the income brackets.

Like elsewhere in Africa, the agricultural situation in the last decade shows many good signs. Child under-nutrition seems to be improving, many crops had production, yield and acreage figures in 2010 that were the highest in recorded history. Also livestock numbers further increased, although – taken together – below the high population growth rates.

Crops with production growth rates beyond population growth (in Uganda that was 138% between 2000 and 2010) and considerable yield increases during that decade (20% or higher) as well as livestock species with a growth in numbers beyond population growth were called 'most successful agricultural products'. For Uganda these cover 21% of the current crop acreage and 16% of the current livestock (TLU) numbers. Rice, maize, cowpeas and sesame and also pigs and sheep (and the dairy industry) belong to this category of 'most successful agricultural products'. Of these agricultural products particularly rice, maize, and sheep are worth further studies as well as the dairy industry, we think. Between 2000 and 2010 the maize acreage increased with 61%, average yields with an impressive 36% (although we acknowledge that the figures on maize yields as presented in FAO and national statistics are highly contradictory, and therefore need further investigation) and hence – if FAO figures are right – maize production more than doubled. Rice acreage increased with 22%, yields increased a lot (with 70%) and production more than doubled as well. Sheep numbers increased with 68% during the decade.

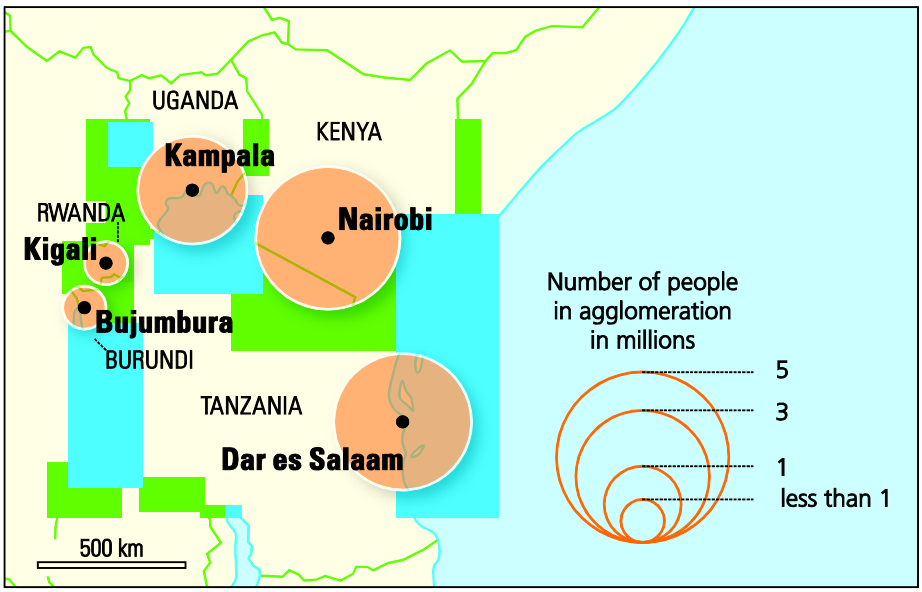
In follow-up studies we would like to find out what made maize, rice, sheep, and cattle so successful: market expansion, institutional arrangements (value-chain and agro-support institutions, including business development) and/or state support.

Market expansion mainly has to do with the expansion of the internal market in Uganda itself. According to FAOstat data very little food is exported (although there will be food [crop and livestock] trade across the borders, particularly with Kenya, Rwanda, the DRCongo and South Sudan, and part of that might go unrecorded). As everywhere else in Africa, Uganda's urban population is rapidly increasing. Its capital city, Kampala, currently has close to 1.3 million people and the Kampala agglomeration was estimated to be close to two million consumers[4]. See Figure 22. However, Uganda still has a relatively low urbanization rate: currently only

[4] ASC poster 'Africa: from a continent of states to a continent of cities' 2012.

16%, coming from a very low figure, 4%, in 1960.[5] Beyond Kampala cities are still rather small: next in line are Kira (near Lake Victoria), Gulu (in the North) and Lira (in the Centre), with 180,000, 154,000 and 109,000 inhabitants respectively.[6] Uganda's current urbanization rate is estimated between 5 and 6% per year (its overall population growth rate still beyond 3%). The last ten years Uganda's economy is booming, and particularly its urban economy. Gradually, the urban consumers increase their demand on urban hinterlands and provide markets for agricultural production growth and innovation. It can also be expected that food insufficiency in nearby countries like Kenya, Burundi and South Sudan increases demand for Uganda's agricultural produce.

Figure 22: Urbanization in Uganda and neighbouring countries



We would also like to study the relevant institutional arrangements for agriculture in general (input support, quality assurance, education/training/extension including the role of the main Ugandan extension delivery service NAADS, credit, marketing support, logistical improvements, etc.) and for maize, rice and sheep and cattle in particular. Government-based institutions are important in Uganda, but the private sector (Uganda-owned, but also some foreign influence) has become important as well, particularly after 1986, and certainly after 2000. The study by Kjaer *et al*. (2012) on the role of the elite and how this shapes government-business relations in the dairy sector in Uganda, is an interesting example of how such a study on institutional arrangements can be conducted.

[5] http://www.indexmundi.com/facts/uganda/urban-population

[6] http://en.wikipedia.org/wiki/List_of_cities_and_towns_in_Uganda. Figures for 2011; according to this source, using the Uganda Bureau of Statistics, Kampala currently has 1.7 million inhabitants.

7 An inventory of relevant background information

A quick search of relevant sources in the academic and non-academic literature available in and around the African Studies Centre in Leiden and on the web gives us the following recent sources, which may be helpful for further preparations of the systematic comparative study that we envisage, as far as Uganda is concerned. The search has been limited to sources published between 1993 and 2013, and only if Uganda has been explicitly mentioned. We start with more general literature about what may be called 'agricultural dynamics', continue with literature about Uganda's food security and nutrition situation and end with specific attention for the three agricultural products that we would like to study: maize, rice and sheep. Where available as a free online source we also give the URL. The list also contains references used in this working paper.

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8. Useful links on food and nutrition security

http://www.ascleiden.nl/?q=research/projects/food-security-and-african-city-clustering-metropolitan-food-chains	ASC-AFCA Collaborative Research Group: Agro-Food Clusters in Africa (AFCA) This ASC collaborative project on Food security and the African city aims to explore and unpack dynamic urban food systems in Africa. The research outputs of this collaborative project are intended to, in part, serve as inputs for ongoing discussions between the Ministry of Foreign Affairs (MinBuza), the Ministry of Economic Affairs, Agriculture and Innovation (EL&I), the Netherlands African Business Council (NABC), Wageningen University (WUR), and the ASC, amongst others, about the establishment of 'Agro-Food Clusters' (AFC) in and around African cities.
http://www.ascleiden.nl/?q=research/projects/africa%E2%80%99s-food-and-nutrition-security-2010-2050	Africa's food and nutrition security: 2010-2050 This research programme will predict the food and nutritional needs of a number of African countries up to 2050 on the basis of: population size, growth rate and composition nutritional requirements by age and sex, and taking activity levels into account demands for various foods Intra-country and cross-country comparisons will be made regarding the choice of crops grown and the animals kept, and food consumption patterns (depending on dietary preferences, incomes and prices). Estimates will be made of the loss to human health and the economy. The projected demands of the future food basket on natural resources (land, water, fertilizer and energy) and the effects of emissions will also be assessed.

http://www.ascleiden.nl/?q=content/webdossiers/food-insecurity-famine-and-drought-africa	Food (in)security, famine and drought in Africa The African Studies Centre's library has compiled this web dossier to provide background information on the food (in)security situation in Africa. This coincides not only with the current food crisis in the Horn of Africa but also with the recent decision by the Dutch government to choose food security as one of the focal points of its economic and development cooperation policy.
http://www.ascleiden.nl/?q=content/asc-catalogue	ASC Catalogue This unique African studies database contains titles of monographs, journal articles and chapters from edited works. Most entries include professional in-depth abstracts. Access to the ASC catalogue is free of charge. Access is available via the Web.
http://www.pbl.nl/en/publications/2012/food-security-in-sub-saharan-africa-an-explorative-study	Food security in sub-Saharan Africa: An explorative study, Report | 02-07-2012 The agricultural production potential of sub-Saharan Africa would be sufficient to make the region food secure. Concerted and region-specific policies are needed to conserve and enhance the natural resource base of soil and nutrients, to make economic growth more beneficial for the poorest populations, and to eradicate the worst cases of malnutrition and food insecurity. In an exploratory study, PBL has analysed environmental and socio-economic trends and identified feasible policy directions at national and international levels.
http://www.sow.vu.nl/	Reporting and research of the world food situation Understanding and assessing the developments of the world food situation is a permanent and broad based activity of the Centre that covers, among others, the evolving status of malnutrition, agricultural and food policy, natural resource management. The world food situation often serves as motivation for fundamental issues in food and development policy, which are to be disseminated both to policy makers and the general public. With respect to the world food situation the Centre focuses on selected topics that need to be signaled more prominently. One example of recent research on food trends is the pressure that may arise in cereal markets due to the strong increase of meat consumption in fast growing developing countries.
http://apf-down2earth.ning.com/	Agriculture, Food Security and Climate Change How farmer entrepreneurs deal with the challenges
https://www.wageningenur.nl/en/Dossiers/file/Dossier-Food-security.htm	Dossier Food security. The world's population is increasing quickly, and it is predicted to grow to 9 billion people in 2050. In less than forty years the earth will gain 2 billion extra inhabitants who will also have to live, work and eat. Fortunately, our prosperity is also predicted to increase, which means that diets will be subject to change.
https://www.wageningenur.nl/en/show/Researchers-combine-food-security-knowledge.htm	Scientists investigating world food issues should unite themselves to provide a sound scientific basis for food security policies. "The way climate scientists have organised themselves in the IPCC, but then a lighter version." That idea arose during the First International Conference on Global Food Security 29 September - 2 October 2013 in Noordwijkerhout, The Netherlands, organised by Wageningen UR (University & Research centre) and publisher Elsevier. The scientific journal Global Food Security - published by co-organiser Elsevier - will also get a special issue with all results from the conference.

http://www.9billiontofeed.com/en/gafsr.htm	The Global Alliance on Food Security Research Six leading agri-food universities and research institutions (WUR, INRA, EMBRAPA, UC Davis, Massey Univ, IVF-CAAS) have joined forces to find ways to increase the world food production in a sustainable manner.
http://seasofchange.net/	Seas of Change: scaling inclusive agro-food markets "From Islands of Opportunity to Seas of Change" The coming decades require an unprecedented change in global agriculture and food systems to assure food security. Agriculture offers the best opportunity for the estimated 2 billion people living in smallholder households to work and trade their way out of poverty. Significant impact on poverty and food security requires change at scale, both scaling up successful approaches and implementing new approaches with scale built-in to the initial design.
http://www.foodsecure.eu/	FOODSECURE for Policies that Matter The EU FOODSECURE programme aims to design effective and sustainable strategies for assessing and addressing the challenges of food and nutrition security. FOODSECURE provides a set of analytical instruments to experiment, analyse, and coordinate the effects of short and long term policies related to achieving food security. FOODSECURE impact lies in the knowledge base to support EU policy makers and other stakeholders in the design of consistent, coherent, long-term policy strategies for improving food and nutrition security.
http://www.gainhealth.org	Global Alliance for Improved Nutrition (GAIN) GAIN's mission is to reduce malnutrition through sustainable strategies aimed at improving the health and nutrition of populations at risk
http://gainmap.gainhealth.org/admin/pdf/Africa.pdf	GAIN Regional Fact Sheet
http://www.gainhealth.org/partnerships/amsterdam-initiative-against-malnutrition-aim	The Amsterdam Initiative against Malnutrition (AIM), a Dutch partnership model that brings different stakeholders together to improve food and nutrition security. The partners in the initiative develop innovative market-based solutions to malnutrition in Africa and Asia. The partners in AIM all bring in their own expertise. AIM was launched in May 2009 during the GAIN Business Alliance Global Forum and its goal is to eliminate malnutrition for 100 million people in Africa by 2015. AIM represents an opportunity to combine the know-how of major players in the food and nutrition industry in seven countries: Kenya, Tanzania, South Africa, Ethiopia, Nigeria, Bangladesh, Indonesia. Dutch Diamond approach – Private, Public, Civil society, Academia multi-sector approach (Dutch Diamond approach – Private, Public, Civil society, Academia) to achieve sustainable nutritional results
http://www.gainhealth.org/programs/lessons-learned-food-fortification-africa	GAIN National Fortification Alliances: Experiences in food fortification from longstanding programs. Reaching 1.5 billion individuals with fortified foods. Experiences from longstanding programs in Nigeria, South Africa, Ghana, Cote d'Ivoire, Mali, Uganda, and Egypt can provide useful lessons for programs in earlier stages including those in Senegal, Mozambique, Kenya, and Tanzania.

https://www.securenutritionplatform.org/Pages/Home.aspx	Secure Nutrition, linking agriculture, food security, and nutrition The World Bank's SecureNutrition aims to bridge knowledge gaps between agriculture, food security, and nutrition. This platform offers a space to exchange experiences and to disseminate and gather information. Please join us in our quest to foster open development through increasing coordination and collaboration in the generation and sharing of knowledge.
http://www.ifpri.org	International Food Policy Research Institute: sustainable solutions for ending hunger and poverty. A memebr of the CGIAR Consortium
http://www.ifpri.org/category/country/east-africa/uganda	IFPRI Publications and Programs: Uganda
http://cgmap.cgiar.org/start.iface?center=IFPRI	CGIAR Medium Term Research Plans
http://cgmap.cgiar.org/projectListView.iface	CGIAR Medium Term Research Plans: 14 projects in Uganda
http://www.cgiar.org/	The Consultative Group on International Agricultural Research (CGIAR) is a global partnership that unites organizations engaged in research for a food secure future.
http://www.cgiar.org/resources/cgiarannual-reports/	
http://library.cgiar.org/bitstream/handle/10947/2789/CGIAR_Annual_Report_2011.pdf?sequence=1	CGIAR is a global partnership that unites organizations engaged in research for a food secure future.
	CGIAR research is dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources. It is carried out by the 15 Centers that are members of the CGIAR Consortium, in close collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia and the private sector.
http://www.fao.org/publications/sofi/en/	The State of Food Insecurity in the World
http://www.fao.org/economic/ess/ess-fs/en/	Food security statistics (Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life).
http://www.fao.org/economic/ess/ess-fs/fbs/en/	Food balance sheets Food balance sheets provide essential information on a country's food system through three components: • Domestic food supply of the food commodities in terms of production, imports, and stock changes. • Domestic food utilization which includes feed, seed, processing, waste, export, and other uses. • Per capita values for the supply of all food commodities (in kilograms per person per year) and the calories, protein, and fat content.
http://faostat.fao.org/	FAOSTAT provides time-series and cross sectional data relating to food and agriculture for some 200 countries.
http://faostat.fao.org/site/291/default.aspx	FAOSTAT "Classic"

http://faostat3.fao.org/faostat-gateway/go/to/home/E	New FAOSTAT (Pilot Version)
http://www.fao.org/economic/ess/ess-capacity/countrystathome/en/	The national version of FAOSTAT, CountrySTAT, is being developed and implemented in a number of target countries, primarily in sub-saharan Africa. It will offer a two-way data exchange facility between countries and FAO as well as a facility to store data at the national and sub-national levels.
http://www.fao.org/fsnforum/	The Global Forum on Food Security and Nutrition. The FSN Forum is a worldwide community of experts and practitioners on Food Security and Nutrition issues and organizes online discussions to exchange knowledge and to inform the global dialogue and decision-making processes. With over 4500 Members from 170 countries and territories, the FSN Forum allows stakeholders such as academics, researchers, development practitioners, governments and the civil society to actively participate in the debate on topics of the global Food Security and Nutrition agenda and to provide constructive feedback along several policy formulation processes.
http://www.asareca.org/	The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is a sub-regional not-for-profit association. It was established in 1994 by ten member countries represented by their national agricultural research for development institutes. The 10 member countries are: Burundi, Democratic Republic of Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania, and Uganda. South Sudan joined ASARECA in 2011.
http://www.nepad-caadp.net/	CAADP stands for "Comprehensive Africa Agriculture Development Programme". CAADP is the agricultural programme of the New Partnership for Africa's Development (NEPAD), which in turn is a programme of the African Union (AU). The CAADP pillars are CAADP's four key focus areas for agricultural improvement and investment. They are 'Sustainable Land and Water Management'; 'Market Access'; 'Food Supply and Hunger'; and 'Agricultural Research'.
http://www.cabi.org/	CABI is an inter-governmental, not-for-profit organization that was set up by a United Nations treaty. CABI's mission is to improve people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment.
http://www.codesria.org/	The Council for the Development of Social Science Research in Africa (CODESRIA) is headquartered in Dakar, Senegal. It was established in 1973 as an independent pan-African research organization primarily focusing on social sciences research in Africa.
http://www.fara-africa.org/	The Forum for Agricultural Research in Africa (FARA) is an apex organization bringing together and forming coalitions of major stakeholders in agricultural research and development in Africa. It is a strategic platform that fosters continental and global networking to reinforce the capacities of Africa's agricultural science and innovation community from research, education/training, extension and civil society engaged in agriculture.
http://www.oecd.org/countries/uganda/	The Organization for Economic Co-operation and Development (OECD) provides a forum in which governments can work together to share experiences and seek solutions to common problems.

	OECD works with governments to understand what drives economic, social and environmental change. It measures productivity and global flows of trade and investment, and analyses and compares data to predict future trends. It sets international standards on a wide range of things, from agriculture and tax to the safety of chemicals.

Any enquiries, suggestions, criticisms: dietzaj@ascleiden.nl. Your assistance is welcome!

African Studies Centre, Leiden; October 2013