

# Policy Briefing

## A cassava industrialisation strategy for Uganda



**The AgriTT programme** is an innovative trilateral initiative between the UK Department for International Development; the Chinese Government; and the Governments of Malawi and Uganda with the Forum for Agricultural Research in Africa. The programme facilitates the sharing of successful experiences in agricultural development with developing countries to improve agricultural productivity and food security.

**AgriTT Pilot Development Projects** work with smallholder farmers, agricultural outreach agencies and policy-makers in Malawi and Uganda to introduce agricultural technology innovations from China and embed these in a value chain, of which farming communities will be the primary beneficiaries. **The Uganda Pilot Development Project** supports the development of cassava value chains.

### A phased approach to large-scale processing in Uganda

**Cassava is one of Uganda's major crops, along with plantain, maize, sweet potato and sugarcane.** In addition to its important role as a staple food crop, demand is also increasing for a range of industrially manufactured products that use different forms of cassava as raw material, and there is potential for developing cassava processing in various directions. The Government of Uganda is prioritising the agricultural sector (including cassava) and the establishment of agricultural enterprises and industries, in order to create employment and reduce the balance-of-payment deficit.

**As one component of the Uganda Pilot Development Project, a trilateral team of experts from Afril (Uganda), Acro Bio-Tech (China) and NRI (UK) analysed the options for large-scale cassava processing,** identifying the most promising markets and appropriate technologies, and formulating business plans for various scenarios. The aim was to provide investors with a detailed analysis to encourage investment in the sector.

**There are wide variations in Ugandan cassava yields reported by different sources, and recent**

**data are not available.** But it is known that the country's annual production of cassava roots was around or above 5 million tonnes (t) until 2011/12, when it dropped to around 3 million tonnes, primarily due to cassava brown streak virus (UN Food and Agriculture Organization, 2014 data). Today, evidence is mounting that in areas where disease-tolerant varieties are used and farmers are trained in the use of good agricultural practices and clean planting materials, yields have increased tremendously. Farmers benefiting from the Bill and Melinda Gates funded Cassava: Adding Value for Africa (C:AVA) and Cassava Seed Systems (CSS) projects have witnessed yields of 15 tonnes per hectare (t/ha), and many agronomists agree that 20 t/ha should be achievable in the near future.

**Field surveys assessed demand for industrially processed cassava products in the short, medium and long term.** Table 1 indicates an achievable short-term demand for cassava-based products (within 2 years) and includes purchase prices offered at the factory gate. Demand for such products is increasing both in Uganda and in other East African Community countries due to factors including economic growth, changing consumer preferences, urbanisation and demographic growth.



Agricultural  
Technology  
Transfer

As Table 1 shows, in addition to High Quality Cassava Flour (HQCF) and other types of starch, there is potential for expanding ethanol production from cassava, and a medium-scale ethanol plant is already up and running in Uganda. Also, animal feeds in the form of both dried cassava chips and processed hard pellets show promise for aquaculture.

Combining the above assessment with a risk assessment for the Ugandan context, the project team recommends focusing preliminary investment in one or more medium-scale starch and HQCF processing plants, with the potential for follow-up investment in

a large-scale sweetener plant when market conditions are appropriate.

- Option A. Medium-scale processing – satellite-type factories processing fresh cassava roots into HQCF and starch. For HQCF/starch production, 20 t per day is the minimum industrial size and corresponds to what the Ugandan market can absorb in the short term. If the establishment of one factory of this scale proves successful, then the construction of more could be implemented.
- Option B. Large-scale processing – glucose syrup production; presupposes the existence of 10 factories at the scale of option A.

Products required by end-user industries	Quantity (t)	Price (US\$/kg)	Price (US\$/t)†
HQCF* for bakeries/ institutions/ composite flour	1,700	1,500-2,000	444-592
HQCF for breweries (milled chips and grits)	6,000	1,000 - 1,200	296-355
HQCF (starch) for paperboard	500	1,500-2,000	444-592
Starch for other industries (e.g. food industry)	1,000	1,500-2,000	444-592
Chips for ethanol production	4,000	800-1,000	237-296
Improved chips or grits for animal feed	1,500	800-1,000	237-325

\* High quality cassava flour.  
† US\$ prices are rounded.

Sources: fieldwork October 2016, AFRIL contacts with buyers, import data and C:AVA studies.

Table 1. Short-term annual demand for cassava-based products and factory purchase prices in Uganda





Estimates for the scale, investment and operating costs, and potential profits are presented in Table 2 below.

Product	Processing factory		
	A. Medium scale		B. Large scale (supplied by 10 × factory A)
	HQCF	Starch	Glucose syrup
Daily output (t)	10	10	100
Annual output based on 300 working days (t)	3,000	3,000	30,000
Raw material required annually (t fresh cassava roots)	12,000 (conversion ratio 4:1)	15,000 (conversion ratio 5:1)	27,600*
Agricultural land required (ha) (assumes yield of 20 t/ha)	1,350		13,500
Potential source of agricultural land Combination of nucleus estate and smallholder outgrowers Likely to pose a challenge given the land needed for 10 × factory A			
Investment cost (US\$ million)	<b>US\$1.644 million</b>		<ul style="list-style-type: none"> <li>glucose plant: 8.45</li> <li>10 × factory A: 16.44</li> <li>infrastructure: 2.8</li> <li><b>total (A+B) US\$27.69 million†</b></li> </ul>
Potential markets	Mainly Uganda plus some neighbouring East African countries		Mainly export given limited size of Ugandan market
Estimated annual operational and management costs (US\$)	1,518,960		16,684,149
Estimated annual sales income (US\$)	<ul style="list-style-type: none"> <li>3,000 t HQCF @ \$320/t</li> <li>3,000 t starch @ \$450/t</li> <li>3,600 t cassava fibre @ \$12/t</li> <li>total 2,353,200</li> </ul>	<ul style="list-style-type: none"> <li>30,000 t glucose syrup @ \$845/t</li> <li>96.6 t crude protein @ \$300/t</li> <li>total 25,378,980</li> </ul>	
Potential annual gross profit (excluding annualised capital costs of investments)	<b>US\$832,400</b> (gross profit of one factory A only)		<b>US\$8,694,831</b> (gross profit of glucose plant only)
<p>* Starch from factories A; corresponds to 138,000 t fresh cassava roots.          † Does not include costs of preparing land and providing extension services to farmers.</p>			

Table 2. Summary of two industrial cassava-processing options for Uganda

## Policy recommendations

**Medium-scale cassava processing (option A) is viable in the short term.**

- A medium-scale cassava production and processing scheme would create employment and contribute to economic growth and the balance of trade.
- The output of one or two factories of this size corresponds to what the Ugandan market can absorb in the short term in terms of HQCF and starch.
- Access to finance (mix of equity and loan) should be relatively straightforward given the size of the investment. Business and finance planning involves assessing the range of finance available, which may include the Uganda Development Bank, Uganda Development Corporation and Uganda Investment Authority, as well as investment funds in China, Africa and other parts of the world. International development finance may also be available if certain criteria are fulfilled (such as support for smallholder farmers).
- The supply of raw material in the form of fresh cassava roots would need to be assured. An adequate yield from a combination of estate and outgrower schemes appears feasible at this scale if improved cassava varieties are used and yields of 20 t/ha can be achieved. It will be important for investors to work closely with growers to ensure a regular supply.
- Also, energy requirements from fuelwood, coal and electricity plus water availability would need to be affirmed for the plant's location, and effluent control would need to be ensured.

**Large-scale cassava processing for glucose production (option B) is a longer term prospect.**

- The supply of raw material at this scale would currently be problematic, and land availability is likely to be an issue. Social studies assessing food security and land ownership are needed.
- As with option A, but at greater scale, adequate energy supply and effluent control would require further examination.
- Investment of the scale required would take time and probably would need to come from a consortium of investors.
- A review of the situation in four years' time is recommended, to include technical, economic, social and environmental assessments for option B.



**A phased approach to cassava industrialisation – starting at medium scale and slowly growing into larger-scale processing – has the potential to create employment and contribute to economic growth in the long term.**



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