YAM IMPROVEMENT FOR PROCESSING (YIP)

GHANA

April 2014
TABLE OF CONTENTS

Executive Summary

Project Mandate and Deliverables

Yam Value Chain

Processing Landscape

Yam support initiatives and Opportunities for Growth
EXECUTIVE SUMMARY

Yams in the Ghanaian landscape

• Ghana is the world’s second largest producer and 3rd largest yam exporter, behind China and Mexico.
• With a one-year production cycle, and limited storage technology, yam is typically available from July to February, and out of season for 3-4 months during the year. White yam is mostly preferred, but high production and transportation costs, makes this yam variety relatively expensive, especially during the lean season, with price increases as high as 200%. In addition, poor harvest and post-harvest handling results in losses of 10-40%.
• Water yam is significantly cheaper and available during the off season, but it is often viewed as inferior.
• Processing is very minimal, with only 5-6 local processors, and only 2 active processors who continue to struggle for survival with limited product innovation, local demand, access to affordable short term and expansion financing options and rising operating costs. As a result, they cater to the taste buds of West Africans residing in Ghana and the export market.

Potential Interventions

• All stakeholders have an important role to play in accelerating improvements in the yam value chain. Building on the Ghana National Yam Sector Development Strategy initiative launched in 2013, the expertise of specific organizations, and the ongoing YIISFWA project, high-level interventions are required to:
  – Address the challenge of consistent yam supply through the creation and professionalization of farmer clusters
  – Address the challenge of processing technology and capacity building through sound research in the use of water yam for high quality yam flour
  – Bridge the gap between the research community and the processing industry through linkages between the YIISFWA team and a new association of roots and tubers processors who can package yam flour under a single brand
  – Reducing barriers to entering processing, through a single door/platform registration within regulatory agencies
  – Increase market demand through broad-based awareness campaigns on available yam products
# TABLE OF CONTENTS

Executive Summary

## Project Mandate and Deliverables

Yam Value Chain

Processing Landscape

Yam support initiatives and Opportunities for Growth
PROJECT MANDATE & METHODOLOGY

The Gates Foundation invited Sahel Capital to conduct a study on the landscape for yam value addition opportunities in Ghana, with a focus on processing for food rather than industry. Sahel was expected to develop robust and sustainable intervention strategies to accelerate yam processing for the BMGF team to consider.

Hypotheses to be Tested - as outlined by the Gates Team

- Overall YIP Theory of Change
- Latent demand for yam processed products in West Africa
- Water yam is the right type for processing, as transforming it into a high quality processed product would add value (taking into account its lower cost of production). White yam generates relatively higher value in fresh form, that processing would lower its value (unless there was a preservation of this in fresh form).
- Yam farmers would be willing to change from mounds to row planting to produce smaller sized but higher yielding yams, if they had a steady market for them.
- Yam processing is a profitable business for entrepreneurs, and their growth would be mutually beneficial for smallholder farmers (SHFs).
- Ghana is the right place to begin investment

Methodology

Focused regions: Brong Ahafo; Greater Accra, Eastern, and Northern regions

- Framing: Assessment of the reports and publications produced by the BMGF, select global, regional, national and state government agencies, development agencies, think tanks and research institutions.
- Interviews with thought leader/experts: The Sahel team engaged in selected interviews with key stakeholders in the research community, private sector (including equipment fabricators, processors, transporters, wholesalers, retailers etc.) community groups and farmers’ clusters and associations, NGOs, regulatory agencies and state/regional and national ministries and parastatals.
KEY QUESTIONS EXPLORED WITH STAKEHOLDERS

Farm-Level Activities:
- Selection of appropriate varieties - What varieties of yam do farmers grow and why?
- Sources and uses of inputs and role of input providers and extension support
- Type of seed bed preparation; cultivation practices – mound vs row planting and time of planting
  - Effects of seed bed quality and planting methods on yam quality
- Weed management practices and pest and disease incidences for new and old crop.
- Farmer engagement in processing, packing and distribution
- Models for farmer-processor linkages that are mutually beneficial
- Requirements for changes in agronomic practices and the provision of market-driven training
- Costs of farm-level activity and variation in pricing and profitability by variety
- The potential for incentivizing sustainable intensification practices to address the environmental damage caused by yam cultivation (expansion of area under cultivation, deforestation associated with staking, soil nutrient depletion, spread of disease due to the planting of infected yam seeds in new areas, etc)

Post-Harvest Handling
- What are the current post-harvest handling practices, including farmer engagement in processing?
- Who are the key players – aggregators, middlemen, clusters etc? Are they risk adverse? If so, why?
- Key sources of losses along the value chain from farmer to consumer?
  - Can the key sources of losses from the farm to the consumer be ranked and any quantitative evidence to back it up?
- What are the challenges associated with storage and transportation, and what role do middle men play?
ADDITIONAL QUESTIONS EXPLORED WITH STAKEHOLDERS

Processing

• Current state of processing/value addition in the yam value chain: By whom, what products, for what market, Pricing?
• What is the potential for yam processed products? What are the constraints?
  • What are the characteristics of yam that a processor would want? Size, varietal, water content, etc.
  • How narrowly should product development be defined? Focus on recognizable yam products like instant pounded yam? Broad brush on products where yam is an ingredient?
• Is there a latent demand for high quality instant yam products? If so, why has it not been met?
• What factors have enabled existing processors to thrive?
• What are the opportunities to leverage/unlock that existing ‘manufacturing’ potential (people, infrastructure, knowledge, networks, etc)?
• What is the market size and marketing channels?
• What characteristics are important to consumers?
• Cost of entry for entrepreneurs? What are the finance options? What risks do they face?
  • What opportunities exist for processors with different levels of capital?
  • Stories of success/failure?
• Should processors also brand or should they feed into a larger chain?
• Does the policy environment support or hinder the value chain? What needs to change?
  • “On-farm processing” practices underlying more traditional and common household uses– this would be in addition to more industrial type processing of “new products”
• What strategies, systems and structures have to be put in place to ensure that private sector processing is mutually beneficial for smallholder farmers?
• Where is the best place to launch this work?
We engaged in extensive field research ...

| FORMAL PROCESSORS | - NEAT FOODS | - SELA FOODS | - ST. BAAK GHANA LIMITED | - LEEHOUSE AND CHEMICAL VENTURES | - SELASIE FOODS |
| FABRICATORS | HORMEKU ENGINEERING WORKS LTD. | GRATIS FOUNDATION |
| RESEARCH INSTITUTES | - FOOD RESEARCH INSTITUTE-CSIR | - FOOD SCIENCE AND TECHNOLOGY – CSIR | - CROPS RESEARCH INSTITUTE – CSIR |
| DEVELOPMENT AGENCIES | - AFRICA LEAD | - AGRAS | - ADVENTIST DEVELOPMENT AND RELIEF AGENCY | - ALLIANCE FOR GREEN REVOLUTION FOR AFRICA |
| GOVERNMENT AGENCIES | - MINISTRY OF FOOD AND AGRICULTURE, TECHIMAN DISTRICT REPRESENTATION | - MINISTRY OF TRADE AND INDUSTRY | - MINISTRY OF FOOD AND AGRICULTURE |
| REGULATORY AGENCIES | - FOOD AND DRUG AUTHORITY | - GHANA STANDARDS AUTHORITY | - GHANA EXPORT PROMOTION AUTHORITY | - FEDERATION OF ASSOCIATIONS OF GHANA EXPORTERS |
| FINANCIAL INSTITUTIONS | - EB - ACCION SAVINGS AND LOANS LIMITED | - KITAMPO RURAL BANK | - AFRICA TRUST | - EXPRESS SAVING AND LOANS | - AGRICULTURAL DEVELOPMENT BANK | - EXPORT DEVELOPMENT AND INVESTMENT FUND |
| SUPERMARKETS | - SHOPRITE | - MAXWART |
| RESTAURANTS/EATERIES | - MAQUIS TAITE MARIE |

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### BRONG AHAFO

#### Farmers
- **Mr. Acheampong Guruma - Kwame Danso**
- **Mr. Neamey Dauda - Galadima**
- **Mr. Kharim Dauda - Atebubu**
- **Mr. Kwabena Anane - Donkone**
- **Mr. Kwamena Daniel - Byeye**
- **Mr. Yaw Michael - Byeye**

#### Wholesalers
- **Ms. Janet Amofoa - Atebubu**
- **Ms. Sophia Duako - Kwame Danso**

#### Consumers
- **Mrs. Khatouna Yakoubu - Bolga Nkwanta**
- **Mr. Lawrence Osei-Bonsu - Kwame Danso**
- **Mr. Mohammed Tahiru - Kwame Danso**
- **Ms. Rebecca Twumwaa - Mem**
- **Mr. Samuel A. Osei - Atebubu**
- **Ms. Rose Brebi - Kwame Danso (Middlemen)**
- **Ms. Fatimata Binta - Atebubu (Processed product seller)**
- **Ms. Ama Amoako - Atebubu (Retailer)**
- **Ms. Anhyineka Akua - Kwame Danso (Roasted Yam Seller)**

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### EASTERN

#### Farmers
- **Mr. Alhassan Djaboru - Maame Krobo-Afram Plains**
- **Mr. Osmanu Ataa - Maame Krobo-Afram Plains**
- **Mr. Joshua Gyimig - Afram Plains**
- **Mr. Frimpong Semankyi - Afram Plains**
- **Mr. Michael Ankoma - Afram Plains**
- **Mr. Anane Wisdom - Afram Plains**

#### Wholesalers
- **Ms. Vida Asantewaa - Ekye-Amanfro**
- **Ms. Abigail Boamah - Afram Plains**
- **Ms. Auntie Ataa Pokua - Ekye-Amanfro**

#### Consumers
- **Ms. Freda Segbefia - Kade**
- **Mr. Gabriel Quahshe - Nkurakan**
- **Ms. Judith Adranyi - Koforidua**
- **Ms. Priscilla Osei- Asibey - Koforidua**
- **Ms. Sheila Osei - Koforidua**

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### NORTHERN

#### Farmers
- **Mr. Gariba Duba - Kpandai**
- **Mr. Nfuyan Bol - Kpandai**
- **Mr. Sampson Nangbi - Kpandai**
- **Mr. Sarpong Eljan - Namumba South**
- **Mr. Cephas Dormediamoe – Commercial Yam farmer**

#### Consumers
- **Ms. Grace Ashe Aisaka - Kpandai**
- **Mr. Morro Gariba - Kpandai**
- **Ms. Rekiba Aidu - Kpandai**
- **Mr. Yaya Inusah - Kpandai**
- **Ms. Haruna Talatu - Kpandai**
- **Ms. Adiza Amadu - Kpandai (Processed product seller)**
- **Ms. Gifty Solomon - Lungnui (Yam flakes seller)**
- **Ms. Janet Tanwin - Lungnui (Retailer)**
- **Ms. Jemila Mohammed – Wulensi (Wholesaler)**
- **Mr. Baba Mohammed - Salaga (Transporter)**
- **Ms. Deborah Tingan - Kpandai (Yam flakes seller)**

### GREATER ACCRA

#### Wholesalers
- **Ms. Samira Amouleye - Agboggloshie Yam Market**

#### Transporters
- **Auntie Judith**

#### Middlemen
- **Mr. William Boahene**
- **Mr. Samuel Ayensu Adu**

#### RETAILERS
- **Ms. Felicia Sam - Thema, Comm.1 Yam Market**

#### CONSUMERS
- **Ms. Maame Sarpong Owusu Takyi**
- **Mr. Bubu Kwami**
- **Mr. Owura Yaw**
- **Ms. Charlotte Someah Kwaw**
- **Mr. Fred Ohene**
TABLE OF CONTENTS

Executive Summary

Project Mandate and Deliverables

Yam Value Chain
- Supply
- Demand

Processing Landscape

Yam support initiatives and Opportunities for Growth
YAM IN THE GHANAIAN LANDSCAPE

Ghana is the:
- 2nd largest yam producer (6,638,867 Tonnes produced in 2012)
- 3rd yam exporter worldwide, and leading exporter of yam - 94% of total yam exports – in West Africa (MAFAP, FAO 2013)

- **Top production areas**: Yam is produced across most regions in the country, except Greater Accra and Upper East. Brong Ahafo, Northern and Eastern regions are the largest production areas, which also feed the export market.

- **In 2012, yield/ha = 15,571.7 kg/ha Vs. 23,000 kg/ha in Mali** (Best practice).
  - 10-40% (1,659,717 to 2,655,547 tonnes) loss due to post harvest handling, transportation and storage
  - 30% of the loss in the production areas is processed in households, into yam flour for Wassa-wassa and Tubani.

Source of data: FAOSTAT 2013
# VARIETIES OF YAMS GROWN IN GHANA

Varieties of yam grown in Ghana are region specific; however, processors and consumers of yam across Ghana tend to prefer white yams, especially the “Pona” variety, which is grown in all the production areas.

## Location

### Brong Ahafo
- **Atebubu, Kokofu, byebye, Galadima**
- **Kwame Danso, Leesi, Lemu, Donkone, Jasipo, Boke akura, Djan kuro, Pakulu**
- **Kulunku, Pona, Larbako**
- **Serwaa/afemetua, asana, bole, yesu mogya, mutwumudu, punjo, dente, gruma, nkeni, asobayire, mamakoma, chalem**
- **Akaba, matches, opolonpo, obonkuruwa, osoronan: (water yam)**
- **These are early maturing varieties which are planted in January. They are ready for harvest by July till Aug-Sept and sometimes October.**
- **These are varieties of white yam which are late maturing. They are planted between January and March. They are ready for harvest by Sept/Oct till Dec/Jan.**
- **Water yams are planted from Feb-April, they are ready for harvest by Oct/Nov till Feb. During the dry season water yam are available for sale in large quantities. By which time, white yam is scarce.**

### Eastern Region
- **Kwahu North Afram Plains (Maame Krobo, Ekye Amanfro, Offei, Charity, Asenysasu, Dome, Ampong, Bonkuro)**
- **Kulunku, Pona, Larbako**
- **Asana, Punjo, dente, kyerekumasi, mpiano, nyame nti, olondo, tila**
- **Akaba, matches, obonkuruwa, osoronan**
- **Early maturing varieties, which are planted in January. They are ready for harvest by July till Aug-Sept.**
- **These are late maturing varieties. They are planted in late Jan/Feb. They are ready for harvest by Sept/Oct - Dec/Jan.**
- **These are water yam. varieties They are planted from Feb-April, they are ready for harvest by Oct/Nov till Feb. During the dry season water yam are available for sale at the market in large quantities.**

### Northern Region
- **Kpandai (Kpandai, Bua, Katiejeli, Nkachina, Bladjai)**
- **Nanumba South (Wulensi, Lungnui, Nakpayili, kpayansi)**
- **East Gonja (Salaga)**
- **Pona, lARBako,**
- **Punjo, yere, saadem, american, nyame nti, lakpam, kelegba, fusembla**
- **Akaba, matches, opolonpo, obonkuruwa (Water yam)**
- **Early maturing varieties which are planted in January. They are ready for harvest by July till Aug-Sept.**
- **These are late maturing varieties. They are planted in late Jan/Feb. They are ready for harvest by Sept/Oct till Dec.**
- **They are planted from Feb-April, they are ready for harvest by Oct/Nov till Feb. During the dry season, water yams are available for sale in large quantities.**

Source: SAHEL CAPITAL field research, 2014
SUMMARY OF FINDINGS: INPUTS

LAND/LABOR
- Most farmers use Inherited land, but a few still rent the land.
- Hired labour is used for land preparation and weeding, while family members and sometimes, friends are involved in harvesting.

SEEDS
- Typically sourced from the farm due to high cost of seeds, while some are purchased from the market. Various methods are used to obtain seeds:
  - **Milking** involves digging the yam tubers in the early harvesting period and putting back the head of the yam inside the mound to germinate as seed
  - The **mini-sett method** consists of cutting the yam into mini-sets (the size of matches boxes) after 4 months of storage of the ware yam, and allowing them to germinate in a basket where they are mixed with saw dust and some water
  - The **setts method** includes cutting ware yams into setts; then using the setts as planting material.

CROP PROTECTION
- Weeding is usually a combination of herbicides and manual work.
- Pesticides are applied by a few farmers.

FERTILIZER
- No fertilizer use because farmers believe that it affects the taste of yam and also attracts rodents to the yam. Farmers also believe that yam grown with fertilizers is “lost” because the head cannot germinate again, when practicing milking.

IRRIGATION
- No irrigation is practiced. Farmers plant according to rainfalls, and current climate change issues affects production.

PLANTING METHOD
- Farmers are resistant to the idea of ridge cultivation, However, a few use ridges to meet the size requirements of the export market. Research institutes are also conducting trials with a few farmers on ridges for planting yams twice within a year.
- Mounds are preferred because they allow for production of bigger yams (sold at higher price) and easier harvesting.
- Hoes and cutlasses are the primary production equipment.

HARVESTING/STORAGE
- After 6 months, yam could be harvested, but farmers leave some inside the mounds for 10 months, to maximize the yams’ size and they sell when yam is scare. This is also another way to store the yam. However, they risk increased incidences of pests and diseases.
- Yams are stored in a shed inside the field, which can hold 500 to 3,000 tubers. Other farmers store yams in big pits inside the field, which can take up to 500 tubers. Better storage sheds made of “zana mats” are used by few farmers in the North, but with higher cost implications. Typically 2-5% losses are recorded from the farmers.
GROWING SEASONS FOR YAM IN GHANA

The production season of yam varies according to the regions and variety of yam. In order to have yam available for a long period, farmers in all regions plant various varieties in their farms (early maturing and late maturing varieties).

### BRONG AHAFO

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<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
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### EASTERN REGION

Intercropping: All farmers practice crop rotation and mixed planting. Maize, cassava, groundnut, guinea corn, pepper, garden eggs and cassava are frequently planted with yam.

Crop rotation: Farmers move from one land to another every year in order to allow it regain soil fertility. In Brong Ahafo, where there is an abundance of land, it might take up to 3 years before a farmer returns to the previous land, while in the Northern and Eastern regions, they wait just 1 year.

### NORTHERN REGION

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<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
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Source: SAHEL CAPITAL field research, 2014
## DESCRIPTION OF FARMERS AND DISTRIBUTORS ENGAGED WITH YAM

There are a range of characteristics that define yam farmers in Ghana and distributors as outlined below:

<table>
<thead>
<tr>
<th>Farmers</th>
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<tbody>
<tr>
<td>• Single/Family production, with no organization into farmer clusters and active associations.</td>
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<tr>
<td>• Cultivate between 5-15 acres</td>
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<tr>
<td>• Have attained little formal education and do not keep records on their production</td>
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<tr>
<td>• Are assisted by women and children for sorting and storage of the yams after they are harvested.</td>
</tr>
<tr>
<td>• Farmers use their yam tubers as collateral. Most farmers will not harvest yam until they have a need to resolve such as paying school fees, or a funeral. Some farmers prefer to wait until yam is scarce, to harvest their last tubers, which are extremely big by that time and can be sold at a higher price, but might be affected by other diseases.</td>
</tr>
<tr>
<td>• Have limited access to cell phones (especially the Northern region).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to Financing</th>
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</thead>
<tbody>
<tr>
<td>• Very few local banks are willing to provide farmers with loans, especially the yam value chain is seen as “risky”.</td>
</tr>
<tr>
<td>• Farmers are asked to organize themselves into clusters, to be trained before they are given loans; but yam farmers are not organized into clusters</td>
</tr>
<tr>
<td>• Middlemen/Brokers provide farmers with loans, at a hidden interest rate of 2% (In fact, farmers pay indirect interest in terms of yam. They pay back the loans in terms of yams and give their debtors, a bonus of 2yams/110 tubers).</td>
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</tbody>
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<thead>
<tr>
<th>Engagement in Processing</th>
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<tbody>
<tr>
<td>• Farmers do not engage into processing, unless they notice spoilage or the yams are broken.</td>
</tr>
<tr>
<td>• Damaged yams are processed by women in the farms, into yam flakes and yam flour, for house consumption, or to be sold in the market.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sales Agents/Brokers/Aggregators</th>
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</thead>
<tbody>
<tr>
<td>• In some production areas, old trade associations are still functioning. They are typically led by a Queen mother and any trader selling in the market has to pay a ‘right to sell’ fee (1GHC/month) and/or entry fee (200ghc).</td>
</tr>
<tr>
<td>• Brokers interface with farmers and middlemen/traders who come to buy from the market.</td>
</tr>
<tr>
<td>• When a farmer brings his tubers to the market, the broker will market it and pay the farmer as soon as the yams are sold. A broker can command up to 20% margin of the sales from each customer, and a smaller allocation from farmers which is determined on a case by case basis.</td>
</tr>
</tbody>
</table>

Source: SAHEL CAPITAL field research, 2014
A comparison of production costs from two farmers with similar characteristics (attended secondary school, and keep production records) in the Northern region, based on production on one acre of land shows some slight differences, in terms of production costs. The actual cost per item is almost the same, but all farmers do not incur all costs as out of pocket.

Some hidden costs are not quantified:

- **Farmer B** hires labour for land preparation, while Farmer A’s family does majority of the work. As a result, he has to share a bigger proportion of his production across the family
- Both farmers’ family and friends are engaged in harvesting
- Both farmers achieve an average yield of 1,000 yam per acre

### YAM PRODUCTION COST – SNAPSHOT OF FARMERS

<table>
<thead>
<tr>
<th>PRODUCTION STAGES</th>
<th>COST (GHC)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer A: Sarpong Elijah</td>
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<tr>
<td>Northern region, Nanumba South</td>
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<tr>
<td>1 acre production cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land preparation</td>
<td>10</td>
<td>Land is inherited</td>
</tr>
<tr>
<td>Planting</td>
<td>10</td>
<td>Yield: 1000/acre; Losses incurred during production not recorded</td>
</tr>
<tr>
<td>Herbicide</td>
<td>63</td>
<td>Herbicide is applied once</td>
</tr>
<tr>
<td>Herbicide application</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Weeding</td>
<td>300</td>
<td>Weeding is carried out 4-5 times</td>
</tr>
<tr>
<td>Harvesting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Storage facility</td>
<td>17</td>
<td>Losses incurred during storage (200/10000) = 2%</td>
</tr>
<tr>
<td>Seeds(40 GHC/100 mounds)</td>
<td>600</td>
<td>Average 50% of seeds used are from the farm, while 50% are purchased</td>
</tr>
<tr>
<td>Fixed costs: Cutlass; Hoe; Spraying machine;</td>
<td>5</td>
<td>Home Consumption: (100/1000)=10%</td>
</tr>
<tr>
<td>TOTAL COST</td>
<td>1,426</td>
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</table>

<table>
<thead>
<tr>
<th>PRODUCTION STAGES</th>
<th>COST (GHC)</th>
<th>COMMENTS</th>
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<tbody>
<tr>
<td>Farmer B: Gariba Duba</td>
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<tr>
<td>Northern region, Kpandai</td>
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<tr>
<td>1 acre production cost</td>
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</tr>
<tr>
<td>Land preparation</td>
<td>110</td>
<td>Land is Inherited</td>
</tr>
<tr>
<td>Planting</td>
<td>20</td>
<td>Yield: 1000/acre; Losses incurred during production (300/10000) = 3%</td>
</tr>
<tr>
<td>Herbicide</td>
<td>32</td>
<td>Herbicide is applied twice</td>
</tr>
<tr>
<td>Herbicide application</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Weeding (60 GHC/acre)</td>
<td>120</td>
<td>Practices weeding twice</td>
</tr>
<tr>
<td>Transportation</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Storage facility</td>
<td>17</td>
<td>Losses incurred during storage (100/8000) = 1.25%</td>
</tr>
<tr>
<td>Seeds(40 GHC/100 mounds)</td>
<td>600</td>
<td>Average 20% of the seeds used are purchased from market</td>
</tr>
<tr>
<td>Fixed costs: Cutlass; Hoe; Wellington boot; Spraying machine</td>
<td>75</td>
<td>Home Consumption (600/10000) =6% of production</td>
</tr>
<tr>
<td>TOTAL COST</td>
<td>1,335</td>
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</tbody>
</table>

Source: SAHEl CAPITAL field research, 2014
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<tr>
<th></th>
<th>Price of a medium yam tuber sold in urban markets located in production regions. Yam variety: Pona</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total farm cost</td>
<td>1.1</td>
</tr>
<tr>
<td>Farmer's margin</td>
<td>0.15</td>
</tr>
<tr>
<td>Farm Gate Price</td>
<td>1.25</td>
</tr>
<tr>
<td>Combined logistical costs (including transportation)</td>
<td>0.35</td>
</tr>
<tr>
<td>Brokers margin</td>
<td>0.4</td>
</tr>
<tr>
<td>Broker Gate Price</td>
<td>2.00</td>
</tr>
<tr>
<td>Transportation cost to urban market</td>
<td>0.3</td>
</tr>
<tr>
<td>Middlemen's margin</td>
<td>0.7</td>
</tr>
<tr>
<td>Wholesale Price</td>
<td>3.00</td>
</tr>
<tr>
<td>Retailer's Combined logistical costs and margin</td>
<td>0.2</td>
</tr>
<tr>
<td>Market Retail Price</td>
<td>3.2</td>
</tr>
<tr>
<td>Slack season prices, cost and margins</td>
<td>XX</td>
</tr>
</tbody>
</table>

Yam prices vary widely based on size of tubers, location and period of the year.

Some varieties of yam are sold at premium prices in Ghana, according to the taste, size, and the variety of yam.

Pona is the premium variety. Its price varies by region, and according to yams seasonality. It is sold for almost the same price in the production areas, but higher in Greater Accra, and sometimes in the Eastern region as well.
WATER YAM IN THE GHANAIAN CONTEXT

- Water yam is cultivated across the key yam producing regions. It is planted in March-April, and is harvested after other varieties which makes it available when white yam varieties are out of season.
- Most consumers do not like water yam and rarely request for it.
- Water yam is however, suitable to process yam flour (Elubo) for Amala.
- Major local varieties include: Akaba, Matches, Obonkuruwa, Obomkuruwa tenten, Osoronan, and Opolonpo.

### Wholesale Prices

<table>
<thead>
<tr>
<th>Medium tuber size (water yam)</th>
<th>Prices (GHC)/110 tubers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEAK SEASON</td>
</tr>
<tr>
<td>BRONG AHAFO</td>
<td>100</td>
</tr>
<tr>
<td>EASTERN REGION</td>
<td>120</td>
</tr>
<tr>
<td>NORTHERN REGION</td>
<td>100</td>
</tr>
</tbody>
</table>

### Areas where Water Yam is Produced

- **BRONG AHAFO**: Atebubu, Kwame danso; Galadima, Byebye, Kokofu, Yemoase
- **EASTERN REGION**: Maame Krobo, ekye amanfo, Sekesua
- **NORTHERN REGION**: Kpandai, buya, katedjeli, Wulensi, lungni, Bimbila, Salaga, Kpanyansi, Banda
DISTRIBUTION OF YAM PRODUCTS IN GHANA

- Wholesalers travel across yam producing regions in Ghana to buy yam. Middlemen/Wholesalers form Accra, Kumasi, and also neighbouring countries (Niger and Burkina-Faso) purchase yam in bulk on market days.
- Wholesalers buy tubers in hundreds from aggregators or farmers from Northern and Brong Ahafo regions, for distribution in the capital cities of each region (Accra, Kuforidua, Kumasi respectively for Greater Accra, Eastern region, and Ashanti region).
- In order to have better margins, some farmers transport the yam from the farm (Northern region), to the markets in Accra and Ashanti region, for sale.

- Yams are transported in trucks, and also in ferries to the Affram Plains. Transportation costs vary by the destination, distance of transportation, and number of tubers. Price also vary sometimes according to the size of tubers.

<table>
<thead>
<tr>
<th>Major Destinations</th>
<th>Cost/100 tubers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern region – Greater Accra</td>
<td>35 GHC – 75 GHC</td>
</tr>
<tr>
<td>Brong Ahafo – Greater Accra</td>
<td>35 GHC – 60 GHC</td>
</tr>
<tr>
<td>Brong Ahafo, Volta region – Eastern region</td>
<td>25 GHC – 30 GHC</td>
</tr>
</tbody>
</table>

- Yam flour is currently sold locally by only one processor NEAT Foods, which distributes via its specialized shop, while Shoprite also sells small quantities. However, Leehouse Chemicals Ventures used to distribute in Accra, Tema, and Kumasi (via shops such as Evergreen, and Maxmart, and also wholesalers).
- All other processors produce for exports.

Processed Products
## CRITICAL PAIN POINTS ACROSS THE VALUE CHAIN

<table>
<thead>
<tr>
<th>ACTORS</th>
<th>KEY CHALLENGES</th>
</tr>
</thead>
</table>
| Farmers             | - High cost of seeds; High labor cost - Inefficient and ineffective labor  
                      - Dead or poor quality seed yams - unable to germinate, or diseased tubers  
                      - Very restricted access to credit facilities  
                      - Attack from insects; rodents and millipedes, pests, forcing sales at lower prices; Rotten yams  
                      - Break and scratches through mishandling of the tools - Shelf life affected by heat and breakages  
                      - Absence of irrigation system - only rely on rainfall which is irregular  
                      - Cattles in the Eastern region                                                                                                                                                                         |
| Transporters        | - Lack of tarred roads on some major axis in production areas - Risks of accidents  
                      - High cost of truck rentals - Inadequate tractors for transportation to market centers  
                      - Delay of ferries  
                      - Demands for bribes from police men  
                      - Traffic congestion in Kumasi and Accra  
                      - Illegal road expenses paid to Ghana Highways Authority’s agents                                                                                                                                         |
| Wholesalers /Retailers | - Low market prices offered by middlemen  
                                 - Lack of credit  
                                 - Lack of storage facilities  
                                 - Risk of loss due to bad roads  
                                 - Risks of accidents, leading to tremendous losses (all yam tubers broken; Death sometimes)                                                                                                           |
TABLE OF CONTENTS

Executive Summary

Project Mandate and Deliverables

Yam Value Chain
- Supply
- Demand

Processing Landscape

Yam support initiatives and Opportunities for Growth
CONSUMPTION PATTERNS ACROSS GHANA

Rural families in the production areas - Northern, Eastern, and Brong Ahafo regions – consume yam as a major part of their diet when yam is in season, with a slight varieties in consumption patterns as outlined below. However, in the South, cassava is mostly preferred because it is cheaper and widely available, relative to yam. The average Ghanaian consumer does not consume industrially processed yam because of fear of chemicals.

**GREATER ACCRA**

- Yam is consumed usually in peak season and on average once a week, either boiled, fried, or roasted.
- Pounded yam is not a common meal because cassava fufu is widely eaten, at a cheaper price and people are not used to pounded yam.
- Foreigners in Ghana, mostly Nigerian residents, are the common consumers of pounded yam flour and amala.

**EASTERN REGION**

- Yam is consumed one to three times a week in the various available forms.
- Pona is the most popular variety, asana is the second most popular option and is eaten either boiled or fried.
- Pounded yam consumption is minimal.

**NORTHERN AND BRONG AHAFO REGIONS**

- Aside from farmer families who eat yam on a daily basis, yam is consumed about three times a week in those regions.
- When Pona is out of season, Serwaa is second most popular variety in Brong Ahafo, while Punjo in the second alternative variety in Northern region.
- Pounded, roasted, boiled yam are most preferred. Industrially processed products are unknown by consumers who prefer processing yam in the household.
BUYING PATTERNS FOR YAM

There are significant variations in buying patterns across channels, with the open market serving as the primary channel.

Open Market:
Majority of the Ghanaian population source yams from the open market; preferences are white yam varieties (Pona, Asana, Serwaa, Punjo).
A specialized shop ensures distribution of Neat fufu in the Accra market.

Supermarkets:
Processed yam flour (Neat Fufu) is distributed in minimal amounts in Shoprite and Leehouse fufu (when it was on the market) was also sold in other supermarkets such as Koala supermarket.
Shoprite is one of the first supermarkets to sell fresh yam.
- Sources average 100pcs of similar sizes of yams monthly, from farmers and middlemen
- Sells at fixed prices.

Restaurants/Eateries:
- Source for an average of 30 tubers each week. They usually provide yam boiled or fried, when some consumers ask for it.
- White yam is preferred, especially Pona.

Exports:
Fresh yam and Yam flour are exported to Liberia, Senegal, the Netherlands, Canada and the United States.
Ghana is the largest exporter of yam tubers in West Africa. Various traders from Burkina-Faso, Niger, and Liberia visit Ghana to purchase yams from Atebubu, Kitampo and Techiman, which serve as the major hubs.

Source: Field Interviews; Ghana Export Promotion Authority
DRIVERS OF DEMAND FOR YAM

The drivers of demand for yam include the following:

Yam Tubers
- Preferred varieties are white yam (Pona, Asana, Serwaa and Punjo)
- Good taste
- Large Size
- Price
- Fresh, firm, smooth, straight and free of obvious defects

Processed Yam Products
- Brand
- Hygienic production processes
- Absence of additives
- Price

Emerging Trends

+ 
  - Emerging formal retail chains such as Shoprite and appropriate shops in the markets which will support distribution of locally processed food
  - Growing demand of fresh and processed yam from other West African countries and diaspora populations in the United States and Europe

- 
  - Growing QSR space, with a greater focus on Western brands such as KFC and Dominos
  - Cheaper substitutes
PRICING VARIATIONS ACROSS CHANNELS

There are significant variations in pricing across different channels, with open air markets providing the cheapest options for both yam tubers and processed products.

OPEN AIR MARKETS

- **Kitampo Market, Brong Ahafo:**
  - Price per outlet: GHC1.5 – GHC7/tuber depending on the season, tuber size & variety
  - Most of the volume moves through this channel

- **Agbogloshie Market, Accra**
  - Price per outlet: GHC2 – GHC7/tuber depending on the season, tuber size & variety

SUPERMARKETS: SHOPRITE

- **Fresh Yam**
  - 5.99/tuber

- **Yam Fufu**
  - GHC7 – GHC 8 / 0.7kg

Source: Field interviews
# SUBSTITUTES FOR YAM IN FORMAL & INFORMAL RETAIL CHANNELS

There are a range of substitutes which consumers prefer or switch to when yam is expensive. Cassava and plantain are widely consumed throughout the country for fufu (mixed pounded cassava and plantain), and available in the southern part of Ghana.

<table>
<thead>
<tr>
<th>NAME OF SUBSTITUTES</th>
<th>MAJOR CONSUMPTION FORMS</th>
<th>PRICE/KG (GHC), OPEN MARKETS</th>
<th>PRICE/KG (GHC) SUPER MARKETS</th>
<th>PRICE OF PROCESSED FLOUR/KG (GHC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YAM (Pona)</td>
<td>FRIED, BOILED</td>
<td>4</td>
<td>5.99</td>
<td>11.43*</td>
</tr>
<tr>
<td>CASSAVA</td>
<td>FUFU</td>
<td>1 – 2</td>
<td>NA</td>
<td>6.40</td>
</tr>
<tr>
<td>PLANTAIN</td>
<td>FUFU, ROASTED</td>
<td>1 – 2</td>
<td>6.99</td>
<td>6.40</td>
</tr>
<tr>
<td>COCO YAM</td>
<td>FUFU</td>
<td>2.5 - 3</td>
<td>NA</td>
<td>6.40</td>
</tr>
<tr>
<td>IRISH POTATO</td>
<td>FRIED</td>
<td>4.5</td>
<td>5.99</td>
<td>NA</td>
</tr>
<tr>
<td>SWEET POTATO</td>
<td>BOILED</td>
<td>2 – 2.5</td>
<td>3.29</td>
<td>NA</td>
</tr>
<tr>
<td>MAIZE</td>
<td>BANKU</td>
<td>2 - 2.30</td>
<td>NA</td>
<td>5.29</td>
</tr>
<tr>
<td>RICE</td>
<td>JELLOF, FRIED</td>
<td>2.50 – 6</td>
<td>4.59 – 6.49</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Retail price of pounded yam flour on the Ghanaian market is usually GHC8 or more for 0.7 Kg packs, while wholesale price from processors is usually GHC7

YAM EXPORTS IN GHANA

Ghana is 3rd largest global exporter of yams and leading yam export country in West Africa (92% of West-African exports).

- 2012 statistics reveal that 25,079 tons of fresh yam and 15 tons of yam flour were exported from the country. However, these statistics are under estimated. Field interviews suggest that the 3 major processors exported up to 411.6 Tons of processed yam flour in 2013. Export destinations include Liberia, Senegal, Netherlands, Canada, United States, Australia, United Kingdom, and Belgium.
- The yam export chain is comprised of farmers, traders, aggregators, commercial Ghanaian exporters, and foreign exporting companies located in Accra.
- Few commercial farmers who are into farming and also export their own yam and sometimes, aggregate yam from other farmers to meet their demand from the foreign market.
- Exporters are organized into associations, and all collaborating through the Federation of Associations of Ghanaian Exporters.
- The Ghana Exports Promotion Authority ensures exports are made under common rules and currently encourages exports, through the export excellence achievement award program where the sustainable export companies are rewarded. This helps to promote the sustainability and motivation of individuals engaged in the export of local goods and services.

![Ghana Yam Flour exports, 2012](image)

Source: GEPA Data, 2012
CRITICAL PAIN POINTS FOR BUYERS

Yam consumers in Ghana are faced with various challenges which are highlighted below:

<table>
<thead>
<tr>
<th>VALUE CHAIN LAYER</th>
<th>PAIN POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSUMERS</td>
<td>• Rotten yam tubers cannot be identified at the time on purchased</td>
</tr>
<tr>
<td></td>
<td>• High prices</td>
</tr>
<tr>
<td></td>
<td>• Inconsistent availability of yam</td>
</tr>
<tr>
<td>SUPERMARKETS</td>
<td>• Irregularity in shape and size is a challenge in packaging</td>
</tr>
<tr>
<td></td>
<td>• Low sales as people prefer to source from open markets</td>
</tr>
<tr>
<td></td>
<td>• Poor storage ability</td>
</tr>
<tr>
<td></td>
<td>• Very limited yam processed products and low turnover</td>
</tr>
<tr>
<td>QUICK SERVICE</td>
<td>• High prices on the market (because is purchased in small quantities at the time it is needed)</td>
</tr>
<tr>
<td>RESTAURANTS</td>
<td>• Yams are not a popular meal on the menu, because demand for yam products are low</td>
</tr>
<tr>
<td>EXPORTERS</td>
<td>• Yam seasonality</td>
</tr>
<tr>
<td></td>
<td>• Breakages incurred during transportation</td>
</tr>
<tr>
<td></td>
<td>• Losses during export</td>
</tr>
<tr>
<td></td>
<td>• Burdensome export requirements from Ghana, and also from importing countries.</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

- Executive Summary
- Project Mandate and Deliverables
- Yam Value Chain
- Processing Landscape
- Yam support initiatives and Opportunities for Growth
INFORMAL PROCESSING

Yam processing in Ghana is dominated by the informal sector.

- Processing is usually home based, and yam is processed into readily edible food, or inputs for cooking.
- Informal processing takes place in the Brong Ahafo and Northern regions by women on the farms. When yam tubers are getting damaged, they are processed into yam flakes for amala which is processed into yam flakes. There are two types of yam flakes – one which retains the yam peels and the other type is prepared from peeled yam. The flakes are milled into flour for amala and wasa-wasa.

**Products created in homes:**
- Ampesi (boiled yam)
- Bayerɛ fufuo (pounded yam)
- Koliko (fried yam)
- Bayerɛ a y’atoto (roasted yam)
- Mpotompoto (yam porridge)
- Bayerɛto (mashed yam)
- Wassɑ-wassa, and Tubani in the Northern and Brong Ahafo regions
# FORMAL PROCESSING IN GHANA

There are 5-6 formal processors in Ghana, but only two are active.

<table>
<thead>
<tr>
<th>PROCESSORS</th>
<th>PRODUCTS</th>
<th>CONTENT</th>
<th>PRICE/KG (GHC)</th>
<th>SHELF LIFE</th>
<th>DISTRIBUTION MARKETS AND SALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEAT FOODS</td>
<td>Yam Fufu (0.7Kg)</td>
<td>80% White yam, 20% Cassava starch</td>
<td>10</td>
<td>2 years</td>
<td>Exports monthly to the UK, Germany, Netherlands, and sometimes to Australia. Also sells small quantities in Ghana</td>
</tr>
<tr>
<td>ST. BAASA</td>
<td>Yam Fufu for Nigerians (0.7kg)</td>
<td>100% White yam</td>
<td>7.15</td>
<td>3 Years</td>
<td>Only exports to Belgium on demand (processed 1 ½ year ago)</td>
</tr>
<tr>
<td></td>
<td>Yam Fufu for Ghanaians (0.7kg)</td>
<td>White yam Mixed with cassava</td>
<td>7.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yam flour for Amala (1kg)</td>
<td>100% White Yam</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELSA FOODS</td>
<td>Yam Flour (1kg)</td>
<td>100% white yam</td>
<td>6.80</td>
<td>2 Years</td>
<td>Processes the yam flour on demand for exports to UK; but getting more consistent market for monthly production</td>
</tr>
<tr>
<td></td>
<td>Yam Fufu (1kg)</td>
<td>White yam; sometimes mixed with cassava starch, according to buyer’s requirements</td>
<td>6.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEEHOUSE AND CHEMICAL VENTURES</td>
<td>Yam flour for pounded yam (0.7kg)</td>
<td>100% water yam; white yam when it is very cheap</td>
<td>10</td>
<td>3 years</td>
<td>Per order - last production was a year ago</td>
</tr>
<tr>
<td>SELASIE FOODS</td>
<td>Yam flour for pounded yam (0.7kg)</td>
<td>Water yam</td>
<td>7.15</td>
<td>2 years</td>
<td>Last production was two years ago</td>
</tr>
<tr>
<td></td>
<td>Yam flour for amala, is processed occasionally</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
YAM PROCESSING METHODOLOGY

There are slight differences in the production process for the two kinds of industrially processed flour in Ghana: Yam flour for pounded yam, and yam flour for the preparation of *amala*. Pounded yam flour is mixed with a high percentage of cassava starch when produced for Ghanaian consumers.

<table>
<thead>
<tr>
<th>Product</th>
<th>Process</th>
<th>Equipment Used</th>
<th>Varieties Preferred</th>
<th>Key Issues</th>
<th>New Innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounded Yam</td>
<td>Sorting Peeling Washing Slicing Pre-boiling Drying Milling &amp; Mixing Packaging</td>
<td>Dicer, Blancher, Dryer (Steam/cabinet tray/continuous band dryer), Hammer mill and cyclone, Sifter or separator, Platform Scales, Bag stitching machine, Precision scales for diff. sizes retail packs, Packaging machine, Washing troughs, bowls, knives</td>
<td>Any white yam: - <em>Pona (good taste)</em> - <em>Asana (starchy content)</em> - <em>Mutwumudu (Big size)</em> - Bayere Pa (very hard and can be stored for a longer period before it spoils)</td>
<td>- A lot of waste incurred during yam peeling - The local dryers take more time. The best dryers are imported from China, where it is cheaper. (about $500,000 USD) -Requires constant electricity or heat for drying -Locally made dryers do not have temperature measurement to identify the right level of dryness -Water required for the entire process to limit browning (Only for pounded yam flour)</td>
<td>- Peeled yams are soaked in water to avoid browning - Then, the yam slices do not need per-boiling - However, this delays the drying duration. - Alternative energy use machines are fabricated locally (diesel engine or solar operated machines)</td>
</tr>
<tr>
<td>Flour for pounded yam (Yam fufu)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pounded yam</td>
<td>Sorting, Washing, Peeling Chopping yams in to medium sizes, Washing, Pre-boiling Mashing yams into smaller sizes, Drying, Milling Mixing with cassava and other additives, Removing weevils Sealing and packaging</td>
<td>Peelers, Chopping machine, Boiler, Masher, Dryer, Mill, Mixer, Weevil machine, Packaging machine, Ssealing machine.</td>
<td>Water yam (Variety not disclosed)</td>
<td></td>
<td>Water yams can be used to process high-quality pounded yam flour, at cheaper cost</td>
</tr>
<tr>
<td>flour made with water yam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yam flour for</td>
<td>Sorting, Washing Slicing, Drying, Milling Packaging, Storage</td>
<td>Peepers, Slicer, Dryer (Bin dryer/Batch dryer), Hammer mill (or mills that may come with silos for direct packaging), Packaging machine</td>
<td>Any type of yam, but usually white yam.</td>
<td>- Takes more time to get dried - Requires constant electricity or heat for drying</td>
<td>The yams do not need to be peeled for this flour</td>
</tr>
<tr>
<td>Amala</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### VALUE CHAIN ECONOMICS FOR A YAM PROCESSOR (GHC/KG)

**Processors purchase yam tubers at an average price of GHC3. In peak season, yam costs GHC2 a tuber, while in lean season, they purchase it at GHC4.**

<table>
<thead>
<tr>
<th>Processing stages</th>
<th>Amount in GHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase of Fresh Yam</td>
<td>3</td>
</tr>
<tr>
<td>Processing &amp; Operating Costs</td>
<td>1.9</td>
</tr>
<tr>
<td>Combined yam flour processing cost</td>
<td>4.9</td>
</tr>
<tr>
<td>Processor's Margin</td>
<td>2.1</td>
</tr>
<tr>
<td>Market Retail Price</td>
<td>7</td>
</tr>
</tbody>
</table>

**Note:**
To process 1kg of yam flour, a processor needs 4kg of fresh yam. It is assumed that the (usually big) yams sourced from the Brong Ahafo region weigh an average of 3kg and some cassava flour (20 – 40%) is added during processing.

On average, a processor can make a profit margin of 15 – 30% on its sales. This is dependent on the scale of operations.

The processor sells directly to the distribution markets.

YAM PROCESSING EQUIPMENT

• There are various local small scale fabricators in Ghana, but the demand for processing machines is very low.
  • Hormeku, and Abenskod Engineering are small scale welders who manufacture processing machines.
• GRATIS Foundation which is funded by the Ghanaian government also produces high capacity engines (Solar dryers and hammer mills).
• Prices vary according to the production capacity. All fabricators produce processing machines only on demand. As a result, they do not have standard prices for their machines.

Yam Processing Equipment and Pricing

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>LOCAL PRICE (GHC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slicer (1ton/hour capacity)</td>
<td>2,800</td>
</tr>
<tr>
<td>Dryer</td>
<td></td>
</tr>
<tr>
<td>Electric dryer - 9,000</td>
<td></td>
</tr>
<tr>
<td>Gas dryer - 35,000</td>
<td></td>
</tr>
<tr>
<td>Solar dryer (500kg capacity) - 5,000 and more</td>
<td></td>
</tr>
<tr>
<td>Electric Bin dryer - 11,300</td>
<td></td>
</tr>
<tr>
<td>Diesel bin dryer (wrought iron) - 11,500</td>
<td></td>
</tr>
<tr>
<td>Diesel bin dryer (wrought iron) - 11,500</td>
<td></td>
</tr>
<tr>
<td>Mill (1 ton/hour)</td>
<td>3,000 (Imported Hammer Mill is 10,000)</td>
</tr>
<tr>
<td>Sifting machine</td>
<td>Not available</td>
</tr>
<tr>
<td>Packaging machine</td>
<td>Not available</td>
</tr>
</tbody>
</table>
REGULATORY ENVIRONMENT FOR FORMAL PROCESSORS – FOOD AND DRUG AUTHORITY (FDA)

- Local food processing companies are required to register products with the FDA
- Officially, the processing time frame is 30 working days, for product licensing and premises registration. However, actual licensing process is often delayed and can take up to 8 months.
- Total registration process can cost over 2,000 GHC
- Product registration has to be renewed every 6 months, while premises registration has to be renewed annually, with the same cost implications

The key Steps required include the following:

1. Product requirements information from FDA
2. Product analysis with a commercial laboratory, prior to registration (up to GHC1250)
3. Medical checking for staff in the production line (cost depends on No of staff members)
4. Licensing application: GHC505 (Registration: 5 Product: 300 Premises: 200)
5. Chemical analysis & premises inspection (Inspection GHC250)
6. Registration number delivered

Source: FDA; GSA; Field interviews
REGULATORY ENVIRONMENT FOR FORMAL PROCESSORS – GHANA STANDARDS AUTHORITY (GSA)

Product certification from Ghana Standards Authority depends on the scale of the company.

- SMEs have a lower cost burden relative to large scale processors (additional processing fee of GHC450).
- The certification is to be renewed every year, with the same cost implications. In all, certification costs an average of GHC255 for an SME and GHC605 for a larger company.

The steps to get the GSA certification are as follows:

<table>
<thead>
<tr>
<th>Step</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter of request for certification</td>
<td>GHCT</td>
</tr>
<tr>
<td>Purchase registration form (GHCT)</td>
<td></td>
</tr>
<tr>
<td>NBSSI registration: 100GHCT</td>
<td></td>
</tr>
<tr>
<td>Factory inspection by NBSSI</td>
<td></td>
</tr>
<tr>
<td>Processing fee payment: 450 GHCT</td>
<td></td>
</tr>
<tr>
<td>Additional: quality control sheet, registration or certificate of incorporation of the company</td>
<td></td>
</tr>
<tr>
<td>Certification delivery: GHCT150 per product</td>
<td></td>
</tr>
</tbody>
</table>

![Flowchart showing steps to get GSA certification]

- Only for SMEs
- Only for larger companies
REGULATORY ENVIRONMENT FOR FORMAL PROCESSORS – EXPORTS

Ghana. Exports are regulated by three different authorities: The Ghana Standards Authority (GSA); Food and Drug Authority (FDA), and Ghana Export Promotion Authority (GEPA).

- The company should be registered with the GEPA, and in addition, it should get a certificate of manufacture and free sales from FDA, and an export certificate from the GSA.
- Food and Drug Authority will conduct a consignment inspection before delivery of the certificate of manufacture and free sales. They typically charge GHC200 for this service. The process for GSA certification is as described below:

  - Submission of Application
  - Inspection and Sampling of Products (GHC 100)
  - Laboratory Analysis & Reports (GHC56, to be released in 3 weeks GHC112 for 5 days)
  - Collection of Export Certificate (GHC300)

Source: Ghana Standards authority, 2014
## CRITICAL PAIN POINTS – FABRICATORS AND REGULATORS

<table>
<thead>
<tr>
<th>ACTORS</th>
<th>KEY CHALLENGES</th>
</tr>
</thead>
</table>
| Fabricators        | 1. Limited demand for processing machines  
                          2. Lack of precision from buyers, in order to fabricate the most adapted machine  
                          3. Limited access to credit and high interest rates |
| Regulatory agencies| • Low capacity in delivering certifications efficiently  
                          • Lack of awareness from processors, to the benefits of certification  
                          • Inexistent standards for new innovative yam products  
                          • Monitoring the respect of standards by processors (conformity between used weighting scales and declared weight of products). |

Source: SAHEL CAPITAL field research, 2014
CHALLENGES FACED BY PROCESSORS

Yams are expensive and processing is capital intensive. Some of the challenges limiting processing are presented in the table below.

<table>
<thead>
<tr>
<th>FORMAL PROCESSORS</th>
<th>INFORMAL PROCESSORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonality of yam prices throughout the year and high costs during the planting season. In addition, yam costs more than most substitutes which are widely available in the south (cassava, plantain, etc.)</td>
<td>Processing involves a lot of stress and physical effort</td>
</tr>
<tr>
<td>Difficulty associated with sourcing dryers with capability to process bulk in a short period of time. In addition, locally made dryers do not have temperature measurement to identify the right level of dryness; which affects results of lab analysis with the FDA. Processors often have to restart the process</td>
<td>Slow market: yam flakes and yam flour buyers are mainly producers of wasa-wasa – a locally processed yam product, which is not widely consumed.</td>
</tr>
<tr>
<td>High cost and long duration for product registration and certification with Food and Drug Authority and Ghana Standards Authority.</td>
<td></td>
</tr>
<tr>
<td>Energy supply is not constant and diesel or gas use is very expensive for processing.</td>
<td></td>
</tr>
<tr>
<td>Limited access to working and expansion capital especially for purchasing machinery</td>
<td></td>
</tr>
</tbody>
</table>
FINANCING CHALLENGES – PROCESSORS

Majority of the yam processing companies in Ghana operate with their personal capital due to dearth of affordable credit opportunities for start-up and small businesses. Indeed, the lack of access to credit opportunities is a key constraint in the yam value chain in Ghana, preventing actors from establishing the appropriate facilities for processing and expanding their operations. Interest rates applied by banks are as high as 26% per annum, and offered for short term periods.

Generally, financing requirements for commercial banks are highlighted below:
• Must have operated for more than 3 years
• Must have substantial collateral
• Require extensive documentation
• Provide bank statement for previous months
• Undergo an overall estimate of the value of the business
# TABLE OF CONTENTS

- Executive Summary
- Project Mandate and Deliverables
- Yam Value Chain
- Processing Landscape

Yam support initiatives and Opportunities for Growth
YAM PROCESSING SUPPORT INITIATIVES - THE YAM SECTOR DEVELOPMENT STRATEGY

The Yam Sector Development Strategy was developed to enable Ghana to become “the leading source of premium quality yam products with global penetration and contributing to an improved Ghanaian economy and livelihoods”, by 2020. Based on five milestones and 6 objectives as outlined in the chart below, the strategy is private sector led, with the collaboration of Ministry of Food and Agriculture, Ministry of Trade and Industry, and the Ministry of Finance.
YAM PROCESSING SUPPORT INITIATIVES – THE FOOD RESEARCH INSTITUTE- CSIR

• Through its involvement in the GRATITUDE project and WAAPP, the Food Research Institute has developed a range of initiatives around yam, including developing new innovative products.

<table>
<thead>
<tr>
<th>PRODUCTS</th>
<th>PERCENTAGE OF YAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yam flour for pounded yam</td>
<td>60 - 80%</td>
</tr>
<tr>
<td>Yam bread</td>
<td>20%</td>
</tr>
<tr>
<td>Yam cookies</td>
<td>40%</td>
</tr>
<tr>
<td>Yam cake</td>
<td>20%</td>
</tr>
<tr>
<td>Yam balls</td>
<td>40%</td>
</tr>
<tr>
<td>Vacuum packed yam</td>
<td>100%</td>
</tr>
<tr>
<td>Frozen yam</td>
<td>100%</td>
</tr>
</tbody>
</table>

• The Institute has also conducted extensive research on use of the waste from yam peels for animal feed and mushroom cultivation.
## OTHER SUPPORT AGENCIES/INITIATIVES

<table>
<thead>
<tr>
<th>AGENCIES/INITIATIVES</th>
<th>MANDATES</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
</table>
| Roots and Tubers Improvement and Marketing Program (MOFA) | Building a competitive market-based Root and Tuber Commodity Chain (RTCC) supported by relevant, effective and sustainable services that are available to the rural poor. | • Have funding from the International Fund for Agricultural Development (IFAD) and the Government of Ghana (GoG)  
• Support to increase commodity chain linkages  
• Support for root and tuber production | • The programme had less focus on yam. However, a new project is at development stage, and include yam as an important crop (Ghana Agricultural Center for Investments Program) |
| GRATIS Foundation                                         | Promote small-scale industrialization in Ghana, through fabrication of machines for flour processing. | • Develop, promote and disseminate marketable technologies and skills for the growth of industry, particularly, micro, small and medium scale enterprises in Ghana  
• Designed processing machine for government Ministries, parastatals and processors  
• Provision of entrepreneurial training | • Demand for processing machines is rare and very unstable. There might be no client for yam processing machines within a year. |
| Crops Research Institute – Part of YIISWA                | Ensure high and sustainable crop productivity and food security through development and dissemination of environmentally sound technologies; including yam | • Through various programmes, has introduced new yam varieties (CRIPona; MankrongPona, CRIKukrupa is also high yielding, early harvesting, and multiple tubering, exportable, MankrongPona and CRIKukrupa can be stored for longer periods) | • Still in only 3 villages located in the Brong Ahafo region. Lack of financial resources and know-how to enhance marketing and distribution at a large scale. |
## OTHER SUPPORT AGENCIES/INITIATIVES (Continued)

<table>
<thead>
<tr>
<th>AGENCIES/INITIATIVES</th>
<th>MANDATES</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME (WAAPP)</td>
<td>Generate and disseminate improved technologies in the participating country’s top priority commodity sub-sector that are aligned with regional priorities. Coordinated by MOFA, and implemented by CSIR</td>
<td>• Initiated the Competitive Agricultural Research Grant Scheme (CARGS) • Validated the use of yam vines for yam seed production • Developing value-added convenience products from yam for urban markets. • Ridging as a mechanical alternative to mounding for yam cultivation. • Promoting use of mini sett technology of mother seed yam multiplication.</td>
<td>• Need to extend to more beneficiaries (89 beneficiaries for ridging; 40 farmers using the vine technology)</td>
</tr>
<tr>
<td>GRATITUDE PROJECT (Gains from losses of root and tuber crops)</td>
<td>Improve the post-harvest management of cassava and yams leading to reduced physical losses and reduced economic losses through value-added processing and valorization of waste. Focus benefits on small-holder households while offering increased income earning opportunities through the development of small to medium scale enterprises</td>
<td>3 innovative ideas were generated to reduce post-harvest losses: • Reduction of physical losses by focusing on fresh yams storage • Value added processing by reducing physical and economic losses in yam and cassava. • Improved utilization of wastes (peels, liquid waste, spent brewery waste) to produce products for human consumption which includes snack, foods, mushrooms and animal feed.</td>
<td>• Few processors have adopted the value added processing for yam (2 processing companies were early adopter)</td>
</tr>
</tbody>
</table>
## OPPORTUNITIES FOR GROWTH

There are a range of opportunities for growth in yam improvement for processing. They include the following:

### Reducing the Cost of processed Yam Products
- **Enhancing Farmer Productivity and Reducing Losses:**
  - Engaging agro-dealers for large seed yam distribution
  - Educating yam farmers on the use of herbicides and fertilizers
  - Improving fresh yam transportation and storage
- **Conducting extensive research on the types of water yams which are most suitable and cost-effective for processing yam flour**
- **Establishing yam processing facilities in the yam production regions (close to farmers)**

### Changing consumers’ mindsets
- Growing need for convenience foods that are relatively easy to prepare, without losing the taste and colour expected by the consumer
- Emerging formal retail chains such as Shoprite, Maxmart, Evergreen, Koala and restaurants, and shops in markets which support distribution of locally processed food.

### Introducing New Products:
- High quality yam flour for pastries
- Yam as an ingredient in the production of beer and spirits
- Yam chips, and vacuum packed yam

### Leveraging Growth in West Africa
- Strategic position in West Africa and growing inter-regional trade
- Improvements in infrastructure across countries.
TABLE OF CONTENTS

Executive Summary

Project Mandate and Deliverables

Yam Value Chain

Processing Landscape

Yam support initiatives and Opportunities for Growth
For Additional Information on the BMGF-YIP Project
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