Africare
A private, nonprofit organization providing development and emergency assistance to Africa since 1970.
Uganda Country Program

MARKET ACCESS STUDY IN THE TESO REGION

FINAL REPORT
JANUARY 2010

CONSULTANT:
JP Management and Training Consultants
P.O. Box 1026, ARUA
TEL. 0782346688, 0392946387, 0372273964, 0476420931

Table of Contents

ACKNOWLEDGEMENTS

We thank all those people who contributed towards the successful completion of this Market Access study in the Teso region. Special appreciations go to Mr. Hyghten Mungoni who marshalled an effective team that facilitated our work in the field without which it would have been more difficult for us to accomplish this assignment. We also wish extend our gratitude to the rest of the Africare team especially Dr. Ignatius Kahiu, Benjamin Aisya and Michael Ebwongu all of whom were instrumental in facilitating our field activities by looking into the logistical aspects of the study and organizing the meetings in Soroti, Kaberamaido, Amuria and Katakwi. In the same vein we extend our gratitude to the wider family in Africare Uganda for their effective participation in one way or the other which made the accomplishment of the study a success because they were always available to clarify any issues and provide any required information.

It is our hope that this report will provide the required insights that Africare needed for future programming and designing of interventions. To all we say ''THANK YOU"!

EXECUTIVE SUMMARY

Africare a leader among private, charitable U.S. organizations assisting Africa has programs in three broad areas: Food security and agriculture, Health and HIV/AIDS, and water resource development. Africare is in the process of exploring methodologies that can convert the hitherto relief and emergency humanitarian support currently being undertaken in North Eastern Uganda, into sustainable rural community development initiatives for recently settled rural communities after a prolonged period of displacement due to insurgency in the region. To this end, Africare hired JP Management and Training Consultants to undertake an *agricultural enterprises market access study* in the Teso region of Uganda which would inform further programming. This report therefore presents the findings, conclusions and recommendations of this study.

The scope of the assignment involved identifying commercially viable agricultural enterprises and examining factors that constrain farmers from accessing lucrative markets for their farm produce. Specifically, the study examined challenges faced by farmers arising from, low farm productivity, high transportation costs, losses through commodity handling and storage, limited access to market information, low commodity farm gate prices, and poor utilization of value addition opportunities.

The following are key findings from the market study:

- Teso region is a main producer of cassava, maize, sweet potatoes, sorghum, ground nuts, beans and millet. It is the leading producer of cassava, green gram and citrus fruits (oranges). The citrus fruits, rice, ground nuts and Bambara nuts are the main crops grown for commercial purposes in the region. The region makes considerable contributions to the national production, highlighting their capacity to produce commercial quantities of these crops. This capacity can be developed by focusing efforts further to exploit market opportunities along specific enterprise lines in order to boost the household incomes.

- Production technologies employed are rudimentary (mainly the hand hoe) which have greatly reduced cultivatable land and quantities produced. The Teso farming system was built around the Ox-plough technology but which was set back by the Karimojong cattle rustling and rebel incursions from the north, which depleted the stock of oxen and other livestock.

- Generally, there is hardly any value addition of commercial proportion done to the produce at the farm gate level, except drying, partial cleaning and grinding into flour, for the staple crops such as cassava, sorghum, potatoes and millet or into paste for the oil seeds like groundnuts and simsim.

- There are weak farmer groups that are heavily reliant on NGOs like Africare and government programmes like NAADS for their existence.

- There are three major market outlets for farmers in Teso; these are the rural markets which account for 10% of the produce sales, the mobile (Hawkers) buyers accounting for 20% and the agent markets (established produce dealers and agents operating in the gazetted markets) like Otuboi, Ocapa and Ocorimongin accounting for 70%.

- Access to financial services is limited. The available financial institutions in the region tend to shun the farmers; only Centenary Bank has presently developed agricultural financial products tailored towards financing farming as a business.

- There is a huge information gap among the Teso farmers which has left them prone to exploitation, by exploitative market actors such as the buyers' agents who even when asked to procure at a higher price by their principals come and offer lower prices in order to make an unofficial cut for themselves.

In line with the findings above, the following key recommendations have been made:

- Development of farmer associations to multiply seed for planting would ensure increased availability, access and affordability of quality seeds, especially improved

varieties that are resistant to harsh weather conditions, pests and diseases. These farmer groups need to be offered training and assured market for their seeds. These farmer associations should be linked with the National Agricultural and Animal Research Institute (NAARI/SAARI).

- Restocking livestock and oxen to enhance production capacity (quantity and quality) through increasing the area under cultivation and improved timeliness of farm operations like land opening and weeding. Apart from tillage, transport and other field operations, work animals can also be used for feeder road maintenance.

- Link farmers to the Savings and Credit Cooperatives that are being established at every sub county in each district, under the Rural Financial Services Programme (RFSP) and Uganda Credit and Savings Cooperative Union (UCSCU). This should be done by organizing farmers to make them bankable.

- Promote market driven agriculture by strengthen the farmer groups and create a change of attitude towards market orientated agricultural practises. Better farmer group organisation and adoption of collective marketing practices will result in amongst others negotiation of better prices as well as other value addition activities like produce bulking.

- Promote multi-sector Public Private Partnerships (PPP) to create integrated market access intervention models which focus on the roles and responsibilities of the actors along the value chains to be able to increase levels of synergies, create efficiency in resource use and increase returns through creating win-win solutions.

1.0 INTRODUCTION

1.1 Background

This report presents the findings, conclusions and recommendations of an *agricultural enterprises market access study* in the Teso region undertaken for Africare Uganda by JP Management and Training Consultants.

A leader among private, charitable U.S. organizations assisting Africa and with an African specialty, Africare is the oldest and largest African-American led organization. Africare programs are in three broad areas: Food security and agriculture, Health and HIV/AIDS, water resource development as well as other areas in environmental conservation and Natural Resources Management, micro-enterprise development, literacy and vocational training, civil society development, governance and emergency response.

Africare is in the process of exploring methodologies that can convert the hitherto relief and emergency humanitarian support currently being undertaken in North Eastern Uganda, into sustainable rural community development initiatives for recently settled rural communities after a prolonged period of displacement due to insurgency in the region. Africare proposes to implement an integrated agricultural approach to help communities in the Teso region of Uganda. Africare has successfully implemented similar interventions in other African countries for sustainable wealth creation and led to expansion of markets for staple crops and diversification into higher-value commodities, without compromising nutrition and food security, and environmental sustainability.

In the three districts of Soroti, Amuria and Kaberamaido in the Teso region of Eastern Uganda, Africare is implementing a Multi-Year Assistance Program (MYAP) a food security program funded by the United States Agency for International Development through ACDI/VOCA (USAID) with P.L.480. It is also working in partnership with the Lutheran World federation to implement the program in Katakwi district. Under the MYAP, Africare is engaged in supporting the target population to transition from relief and emergency humanitarian assistance to sustainable rural community development initiatives for recently settled rural communities after a prolonged period of displacement due to insurgency in the region. This is being done through providing training in improved farming methods, post-harvest handling, improved household nutrition, hygiene and sanitation practices, natural resources management, group savings and mobilization as well as providing them with improved seeds and farming inputs.

In order to effectively facilitate this transition, Africare-Uganda with funding from the Ford Foundation Eastern Africa Environment and Economic development Office commissioned a market study with the objective of examining factors that constrain farmers from penetrating the lucrative markets for their farm produce and proposing strategies for resolving marketing challenges faced by the farmers. The study is also intended to identify opportunities for interventions relating to enterprise development and business and market linkages that will revitalise the agricultural sector in the Teso region as the people resettle and the security situation returns to normality.

Africare recognises that owing to insurgencies and cattle rustling by the Karimojong warriors over the last two decades, the Teso region suffered an economic meltdown with a systematic collapse of the social infrastructure and social fabric as the communities got condemned to living in protected camps. However, following the cessation of hostilities and the success of the government's Karimojong disarmament programme, normality has returned to most parts of the region and the Internally Displaced Peoples camps (IDPs) have been closed. As a result there is now a deliberate effort by development agencies and the government of Uganda to reconstruct the region and support the economic recovery process. The backbone of the economy in the region is agriculture both crop and animal production in which the region holds a comparative advantage over most other regions in the country. One of the key factors that can spur the economic recovery of this region is increased access to viable and sustainable agricultural production technologies and then markets for both crop and animal products.

The market access study therefore aimed to review the agricultural sector in the Teso region to identify enterprises that can be developed into economically viable commercial enterprises; assess the capability of the existing marketing infrastructure and identify constraints to accessing profitable and sustainable markets. This is intended to aid the design of an effective intervention for increasing marketability of the farm produce from the region, increase farmer incomes and improve livelihoods of the people as they resettle to a productive life after the camps.

1.2 Assignment Objectives

The main focus of the market study was to identify commercially viable agricultural enterprises and to examine factors that constrain farmers from accessing lucrative markets for their farm produce. Specifically, the study examined challenges faced by farmers arising from, low farm productivity, high transportation costs, losses through commodity handling and storage, limited access to market

information, low commodity farm gate prices, and poor utilization of value addition opportunities. These analyses informed the recommendations made.

The study objectives as articulated in the Terms of Reference (ToR) were;

i. Survey and characterize marketable agricultural products produced by the communities in the Teso region.
ii. Rank the various enterprises according to agreed criteria in the order determined by the community representatives. These criteria will include availability of market (local and International Demand), profitability, food security value and local capacity to produce commercial quantities.
iii. Assess the existing marketing infrastructure including post-harvest innovations and practices and identify constraints to market access and production.
iv. Identify opportunities for interventions relating to enterprise development, business and market linkages
v. Recommend intervention strategies to address market access, production and infrastructural constraints so as to match the production and access to profitable markets system.

1.3 Study Methodology

In executing the assignment to achieve the stated assignment objectives as articulated in the ToR, the consultants carried out the study in two phases;

Phase 1

We conducted a trans-sectional study of the market with the objective of profiling the various sub-sectors in the Teso market; this profiling included:

1. Determining the major agricultural crops (enterprises) grown in the Teso region
2. Estimating the output levels, and production potential of each of these crops in the Teso region
3. Reviewing farming & production structures, farmer institutional set up and agribusiness marketing infrastructure in the region.
4. Ranking the various agricultural enterprises produced in the regions according to the selected ranking criteria which included profitability, viability, production competencies, market sustainability and food security.

While conducting the Phase 1 field work, farmers and other respondents were asked to rank the enterprises grown in the various parts of Teso region on three predetermined criteria namely

food security, market availability and production experience. At the end of phase 1, the preliminary findings were presented to the Africare team. The objective of this presentation was to discuss and select a set of enterprises that the consultants could explore further to establish their feasibility as potential target enterprises for any market access intervention.

The team selected the following enterprises for further consideration in phase II of the study;

1 Cassava
2 Maize
3 Groundnuts (Peanuts)
4 Sesame (Simsim)
5 Bambara Nuts
6 Green Gram
7 Tomatoes
8 Onions

Phase 2

The objective of Phase II of the study was to conduct a more focused and detailed sub-sector market study for each of the selected enterprises in order to identify priority enterprises from the list selected in phase I for future intervention. The specific focus of the phase II study was to;

1. Performing a sub-sector analysis for the selected priority enterprises to determine;
    a. Available marketing channels
    b. Productions costs, market size and gross margins
    c. Analyzing the existing distribution channels, their cost structure and challenges the farmers faced.
2. Identifying what appropriate technologies are available for post harvest processing, value addition and preservation of various key products
3. Analyzing the potential for developing cottage industries and small-scale processing units for agriculture and livestock products
4. Identifying opportunities for market linkages that will increase opportunities to access markets for both farm products and value added products

The recommendations made are based on the findings from the study in both the two phases. On the same basis strategies for possible intervention to address the identified market and production gaps, take advantage of existing market opportunities and scale up development efforts towards

achieving the desired agricultural production potential of the selected enterprises in the region have been recommended.

1.3.1 The Sample

The consultants constructed a sampling frame with the help of the Africare team which consisted of farmer groups in all the 6 districts in the Teso region. 4 districts were then selected which included the three districts in which Africare operates. The sampled districts were, Soroti, Amuria, Kaberamaido and Katakwi. Seven sub counties were subsequently selected from the 4 districts. The sub counties selected were;

Soroti District;	Soroti County: Gweri Sub-county
	Serere County: Kateta and Pingire
Kaberamaido District:	Kaberamaido County: Kaberamaido sub-county
Amuria District;	Kapelebyongi County: Obalanga Sub-county
	Amuria County: Orungo Sub-county
Katakwi District:	Usuk County: Toroma Sub-county

Farmer groups were randomly selected as respondents to participate in the focus group discussions from each of the selected sub counties. Two focus group discussions were conducted in each sub-county with different farmer groups and at least one key informant at the level of the sub-county production officer or higher were interviewed in each of the sub-county in order to triangulate the information collected. Local government officials who included the district and sub county chiefs, other technical personnel and community leaders like Local Council III chairpersons constituted the pool of key informant interviewees. Key informants were also interviewed in phase II of the study mainly selected from the commodity market trail and the high level farmer organizations (Apex bodies) as well as government and government development organizations or programs like NAADS.

1.3.2 Data Collection Methodologies

The team collected both qualitative and quantitative data, primary and secondary data (through documents review) using selected tools. Specifically the following data collection methodologies were used;

Qualitative Methods

Focus group discussions and key informant (stakeholder) interviews and document review were used to collect qualitative data. Participatory appraisal methods were used in all focus group discussions; in using this method we achieved the following;

- Built trust, rapport and understanding between the consultants and the respondents
- Ensured that the perspectives and realities on the ground and from the future beneficiaries of any interventions were accurately reflected in the study.
- Allowed the different stakeholders and especially those whose voices are marginalized, to articulate and present their views and expectations, needed to develop longer term sustainable strategies.

Open ended questionnaires were used for data collection. This allowed probing and important dimensions to emerge leading to an in-depth understanding of the key elements of the study. Resource maps and seasonal calendars were also applied as tools for focus group discussions.

Quantitative Methods

Focus group discussions and key informant interviews were again used to obtain quantitative data, most of the quantitative data obtained related to but not limited to production levels, costs structures, market performance and profitability or income indicators. Besides the focus groups, key informant interviews were also done, supported by document review to collect secondary data relating to the past events.

1.3.3 Data Collection Tools

The consultants administered an open ended questionnaire which was the main tool used for data collection both for the focus group and key informant interviews. Two types of questionnaires were designed and used during the data collection:

1. *The Focus group questionnaire:* This was used to guide focus group discussions. The questionnaire served as a topical guide and road map for the discussions thus ensuring precise and relevant data was collected. This tool was supplemented by participatory tools like resource mapping, use of the seasonal calendars and the problem tree analysis approach to unearth some underlying issues.

2. *The key informant questionnaire*: This tool was used to conduct interviews with key informants. Key informants included persons (or group of persons) who have unique knowledge of the region or professional background related to the issues addressed in the TOR.

The consultants developed these tools which were discussed and reviewed together and agreed upon with the Africare team at the inception meeting.

1.4 Limitations and Challenges

In carrying out the assignment, some challenges were met. The main ones were:

a. Limited availability of agricultural production and marketing data at the local government, district and national level. Most data at the national level lacked specificity which meant that consultants had to carry out some modelling to develop specific trends relating to the Teso region.

b. The study has been carried out at a time when the people of Teso are just returning and trying to resettle back to normal life from a long period of insurgency. There exists a gap in information on agricultural production especially the period from 1986 to 2007.

c. The agricultural sector in the Teso region has been taken back over 20years, and can be described as being in its infancy again; most of the challenges are problems explained by the farmers are generic and typical of an infant sector.

2.0 AN OVERVIEW OF THE AGRICULTURAL SECTOR

2.1 National Agricultural Sector

Agriculture remains the main sector for Uganda's economic development. It employs 73.3% of the active labour force compared to the services sector which employs 22.5% and industry only 4.2%[1]. An estimated 86% of Uganda's population lives in rural areas. The sector is an important stimulant for economic development in the rural areas and drives the non-farm activities like trade, education, improved housing, and energy sources. The sector is a major source for Uganda's export earnings accounting for 43% (excludes fish but includes livestock and livestock products) of export earnings in 2006[2]. It remains the most promising in terms of export diversification in the foreseeable future. Above all agriculture is the dominant single contributor to the GDP (31% in 2005/6) rivalled by trade and community services at 13.5% and 13.0% respectively in 2005/6)[3].

In the production sector, food crop production predominates, contributing approximately one-half of the agricultural GDP in 2005/2006, while cash crops provided a further 17%, the livestock sub-sector 16%, fisheries 12% and forestry 4%. Agricultural output at present comes mainly from about 3 million smallholder farmers with a hoe being the predominant technology for cultivation. The GDP contribution from the agriculture sector has been declining over the last four years down to 21.5% in 2008[4]

The Government of Uganda (GOU) has increasingly continued to formulate more refined and focused development programmes aimed at alleviating poverty and promoting agriculture financing initiatives. Such programmes include the Plan for Modernization of Agriculture (PMA), which is a holistic framework for modernizing and enhancing agricultural growth.

2.1.1 Plan for the Modernization of Agriculture (Highlighting agricultural zoning)

The PMA is the Government of Uganda plan for fighting and eradicating poverty from Uganda through changing the current subsistence agriculture to commercial agriculture. By modernizing agriculture, poverty will be eradicated through;

- Increasing production thus ensuring that there is enough food for all people at all times.

[1] Statistical Abstract 2006
[2] Statistical Abstract 2006
[3] Statistical Abstract 2006
[4] Statistical Abstract 2009

- Farmer access to knowledge, improved seed, and other relevant information
- Access to markets and market oriented enterprise selection
- Creation of more on-farm and off-farm jobs related to agriculture.

The following are the PMA priority areas.

a) Agricultural research and technology development.
b) Agricultural advisory service.
c) Rural finance.
d) Agro-processing and marketing.
e) Agricultural education.
f) Sustainable natural resource management.
g) Physical Infrastructure.

Implementation of the PMA

There are 3 key players in the implementation of the PMA namely: the Private Sector, Local Governments (LG) and Central Government. Other players include civil society organisations and development partners.

Central Government: The core function of the Central Government is to ensure good policies, laws and procedures are in place for the successful implementation of the PMA. The different ministries handle the responsibilities for policies, laws and procedures that fall directly under their individual mandates.

Local Governments (at district, sub-counties and parishes): Under the PMA, the LG is responsible for;

- Making district agricultural sector plans
- Technical supervision of agricultural advisory services
- Provision of services for the management and control of pests
- Land survey and administration
- Forestry and wetlands management
- Control of soil erosion, bush fires, local hunting and fishing; and
- Licensing produce marketing.

Private Sector: These actors include subsistence farmers, traders, processors and service providers who are directly responsible for undertaking the key activities of operationalising the PMA and its success. The key activities include: production, processing, storage and marketing of agricultural inputs and outputs. The private sector will also be responsible for the provision of advisory services under the government's policy of outsourcing advisory services.

Civil Society: These include NGOs, CBOs, individuals, unions, professional bodies and associations that are involved in the promotion and delivery of services. They are a very important interest group who will be involved, in collaboration with other stakeholders in the process of planning, implementing, financing and delivery of services, especially at lower levels of government.

Development Partners: Development partners in the PMA include international donors and bilateral partners/governments that support national development activities in the agricultural sector through grants and soft loans. They play a key role in providing funding to key activities that government intends to fund under the PMA.

Agricultural Zoning

In 2004, Government launched a national Agricultural Zoning Strategy, which is based on the principle of comparative advantage. An 'agricultural zone' is a broad area with similar socio-economic background and in which ecological conditions, farming systems and practices are fairly homogeneous. The strategy was developed within the PMA framework, and has been widely promoted as a basic principle for agricultural development.

Benefits of agricultural zoning include:

- Promoting agricultural enterprises (crops, livestock and fisheries) in those agro-ecological zones of the country with natural resources that are best suited to their respective production
- Making it easy to target provision of marketing services such as market information, extension and rural finance to farmers for the respective zones.
- Increasing agricultural production and productivity,
- Facilitating greater efficiency in commodity value chains.

- Making it easier to plan and utilize zonal resources, such as infrastructure, more effectively

The strategy maps Uganda into ten agricultural production zones:

1. North Eastern Dry lands – Moroto, Northern Kotido and Eastern Kitgum (Gum Arabica, Simsim, Apiculture, Goats/Skins, Beef cattle/Hides, Ostriches, Sunflower)
2. North Eastern Savannah Grasslands – Pader, Kitgum, Eastern Lira, Katakwi, Northern Sironko, Northern Kapchorwa, Nakapiripirit, Southern Kotido (Apiculture, Beef cattle/Hides, Goats/Skins, Simsim, Cassava, Pulses, Sunflower)
3. North Western Savannah Grasslands - Adjumani, Western Nebbi, Arua, Moyo, Yumbe, Northern Gulu, Northern Apac, Western Lira (Spices, Tobacco, Apiculture, Cotton, Pulses, Simsim, Robusta coffee)
4. Para Savannahs – Eastern Nebbi, South-Western Gulu, Western Masindi (Spices, Fisheries, Cassava, Apiculture, Beef cattle/Hides, goats/Skins, Cotton)
5. Kioga Plains – Kayunga, Kamuli, Iganga, Northern Bugiri, Tororo, Northern Busia, Southern Mbale, Pallisa, Kumi, Soroti, Kaberamaido, Southern Lira, Southern Apac (Fisheries, Apiculture, Maize, Pulses, Beef cattle/Hides, Cassava, Goats/Skins)
6. Lake Victoria Crescent – Kampala, Mukono, Wakiso, Eastern Mpigi, Eastern Masaka, Eastern Rakai, Kalangala, Jinja, Mayuge, Southern Bugiri, Southern Busia (Robusta coffee, Fisheries, Spices, Floriculture, Horticulture, Vanilla, Cocoa, Dairy cattle)
7. Western Savannah Grasslands – Hoima, Kiboga, Southern Luwero, Mubende, Kibaale, Kyenjojo, Kabarole, Kamwenge, Southern Kasese (Robusta coffee, Tea, Apiculture, Maize, Bananas [Brewing], Beans, Beef cattle/Hides)
8. Pastoral Rangelands - Eastern Masindi, Nakasongola, Northern Luwero, Central Kiboga, Southern Mubende, Western Mpigi, Western Masaka, Western Rakai, Sembabule, Eastern Mbarara, Southern Ntungamo, Northern Bundibugyo (Beef cattle/Hides, Dairy cattle, Goats, Spices, Apiculture, Citrus, Pineapple)
9. South Western Farmlands - Western Mbarara, Bushenyi, Northern Ntungamo, Rukungiri, Northern Kanungu (Robusta coffee, Tea, Dairy cattle/Hides, Fisheries, Bananas [Dessert], Vanilla, Tobacco)
10. Highland Ranges - Mbale, Southern Sironko, Southern Kapchorwa, Southern Kanungu, Kabale, Kisoro, Northern Kasese, Southern Bundibugyo (Arabica coffee, Passion fruits, Vanilla, Dairy cattle/Hides, Spices, Maize, Irish potatoes)

The NAADs programme is already implementing the strategy by promoting certain enterprises in given districts and zones.

2.1.2 National Agricultural Advisory Services (NAADS)

NAADS is one of the seven components under the Plan for Modernization of Agriculture (PMA), the planning framework of the government for the transformation of subsistence agriculture to market oriented for commercial production. The NAADS programme aims to redress past shortcomings in the provision of the agricultural extension services through far reaching reforms and innovative approaches in service delivery.

The National Agricultural Advisory Services (NAADS) program of Uganda is an innovative public-private extension service delivery approach, with the goal of increasing market oriented agricultural production by empowering farmers to demand and control agricultural advisory services. NAADS programme is run under the following six components within which its anticipated outputs are defined.

i. Farmer Institution Development:
ii. Advisory services and information to farmers.
iii. Agri-business Developed and Market Linkages
iv. Capacity Development for Service Provider
v. Planning, Monitoring and Quality Assurance
vi. Programme Management and Coordination

At District level, NAADS is involved in the following;

i. Supporting consolidation of strategic enterprises at zone level
ii. Technical back stopping of sub-counties
iii. Technical Audit and quality assurance
iv. Monitoring of activities

At the sub-county level, NAADS is involved in the following:

i. The procurement of improved technologies (improved seeds, breeding stock etc) for demonstrations or multiplication.
ii. Provision of advisory services
iii. Support farmer capacity and organisation

In addition, sub-counties which have participated in NAADS programme for over 2 years, receive a fund known as Integrated Support to Farmer Groups (ISFG). Whereas ISFG is used to support farmers to acquire improved technologies and inputs, it also enables each group to start a Group Revolving Scheme.

2.2 Situational Analysis - Teso Region

2.2.1 Farming systems

Agricultural production is carried out on the basis of farming systems that are categorised according to agro-ecological zones, soil types, rainfall and cropping patterns. The farming systems in Eastern Uganda, is referred to as the Teso system. A farming system is defined as an area where the prevailing environmental conditions (physical, biological and human), allow similar agricultural practices[5].

The Teso Farming System (TFS) region comprises the semi-arid north-eastern districts of Soroti, Katakwi, Kumi, Kaberamaido, Amuria and Bukedea. The area is characterized by bi-modal rain falling on sandy-loam medium to low fertility soils. The dry season is longer from December to March. There is short grassland ideal for grazing. The system is agro-pastoral with rural communities heavily dependent for their livelihoods on subsistence mixed annual cropping and livestock production. It is a unique system, principally due to the characteristic predominance of ox-plough cultivation, as the main agricultural technology, favoured by the existing gently undulating topography. The crop-livestock interaction gives an important synergy as animals provide draught power for land tillage and manure for crop production, while crop residues and straw are consumed by the livestock. It is a unique system, principally due to the characteristic predominance of ox-cultivation favoured by the existing gently undulating topography (Awa *et al*., 1999)[6].

The staple foods are cassava, potatoes, millet, maize and sorghum; other crops are oil seed crops (ground nuts and simsim – sesamum indicum). Cotton was the main cash crop but has declined due to the recent decline in the use of ox-plough technology and the increased reliance on the hand hoe occasioned by the cattle rustling that affected the region. Growing cash crops needs to be done on a

[5] Ministry of Agriculture, Animals and Industries, 1997

[6] AAjulong wa, A.A., Goromela, E.H., Okurut–Akol, H., Sembiring, H., Spilsbury, J and Touza, A.L. (1999). Towards a better integration of livestock and crops in the Teso farming system. A joint publication of the International Centre for Development Oriented Research in Agriculture (ICRA) Netherlands, and Serere Agricultural and Animal Production Research Institute (SAARI) Uganda

large scale and covering a wide area, which can only be done using better and faster technologies for land opening.

Factors Contributing to Reduced Incomes and Food Insecurity

i. *Change in agriculture technology:* The shift from the ox-plough based farming technology to the hand hoe has led to shortages of labour to carry out agriculture activities. This is because all the households are involved in similar activities at the same time, making it difficult to get extra labour for land opening. In addition, the shift led to reduction in cultivated land, further contributing to decline in food production.

> *…….The Karimojong took all our cows and now we have to depend on the hand hoe to till the land which makes us unable to open enough land for farming, we are afraid to restock oxen because whenever we attempt to do the Karimojong always come and take them……*
>
> ***Mr. Akura Willy-Orungo Arubela Akoyo Amuria district***

ii. *Rainfall variability:* brought on by the prolonged and unpredictable dry spells and variability in rainfall patterns across the region. The region has suffered severe effects of drought punctuated by heavy rains and floods both of which have destroyed farmlands. Most recent was the drought in 2006 which was followed by severe flooding in 2007 and again a prolonged drought in 2009.

> *The 2007 flood disaster caused destruction of all the crops we planted and forced people into internally displaced people's camps hoping to get relief assistance, even the crops we have planted now have all dried because of the prolonged drought, we don't know what will become of us and whether we shall get food because we have no sources of money to buy food.* ***Ms. Ajulong Grace-Apuuton Toroma Katakwi District***

iii. *Political instability:* The change of government in 1986, exposed the region to an escalation of cattle rustling which deprived the region of vital farm technology (the ox-plough) through the removal of oxen. The emergence of rebel activity in the Teso region from 1986 to 1990 and the incursion of the lord resistance army rebels into the Teso region in 2003 further complicated and set back all recovery efforts. People were displaced and confined to internally displaced peoples camps where they could not access and attend to their gardens. The People have now returned and resettled in their homes and agricultural activities are just picking up, technological constraints have limited the present capability to reach the regions full potential.

iv. *Cattle raids:* The raids by the Karimojong deny the population of cattle to provide milk, meat and cash income. Most importantly the loss of animals deprived the region of the most progressive ox-

plough farming technology available to rural farmers. Teso region was amongst the most advanced regions in the country in the use of animal traction technologies for farming and transportation.

v. *Plant diseases;* farmers have attributed reduction in productivity to increasing effects of disease to crop yields, a major example is the effect of the cassava mosaic virus to the production of cassava and ground nut rosette, which greatly reduce the yields from the old groundnuts variety.

2.2.2 Agriculture based interventions by other organizations/programs

TABLE 1: Interventions by other organisations/ programs

Institution	Intervention
AFRICARE	Promoting horticultural crops especially vegetables and infrastructure development by rehabilitating rural feeder roads in the districts of Soroti, Amuria and Kaberamaido.
Food and Agriculture Organization (FAO) (In all districts of Teso region)	Training and inputs to enable host communities to resume crop and livestock production boost food availability and strengthen self-reliance.
TEMEDO (In Soroti and Kaberamaido districts)	Agricultural support to returnee IDPs, small farm implements, seed and breeding goats, oxen, training farmers on production improvement and income self sufficiency
SOCADIDO (in Amuria)	Support to household food security for resettling and returning IDPs
CIDI (in Amuria district)	Support for improved agriculture production to attain household food security

3.0 FINDINGS

3.1 Production Aspects

3.1.1 Agricultural crops grown in the region

The focus group discussions were used to identify the major types of crops grown by the farmers, across the Teso region and these were categorized into three namely; Category one: crops which compose mainly of staple crops grown primarily for food security but also sold for household income, Category two: crops grown for preparation of local sauces as major components of the recipe for the local house dishes and Category three: Crops grown purely for commercial value but when there is a need they act as an alternative source of food**.** The table below shows the different crops and their categorization

Table 2: Major crops grown in Teso region by category

Category one (Staple foods)	**Category two (Sauces and toppings)**	**Category three Commercial &food security**
• Cassava • Sorghum • Potatoes • Maize • *Millet • Sweet potatoes	• Beans • Groundnuts • Assorted vegetables (Cabbages, Egg Plants, Sukuma wiki, Dodo, gynandra) • Cow Peas	• Rice • Simsim (Sesame) • Green Gram • Soya Beans • Bambara nuts • Tomatoes • Onions • Tomatoes • Fruit trees (mangoes, Paw paws, Citrus) **Commercial purposes only** • Sunflower • Cotton • Bananas • Water melon • Pearl millet • Sugar cane

***** *The production is declining and it has been relegated to lowest priority as a food security crop, though historically it was number one.*

Production of the staple foods (category one) occurs in all the districts and sub-counties in the districts of Teso region. A typical meal in a Teso household will consist of a high starch category one food with a category two vegetable dish in groundnut/simsim sauce or meat (fresh or dried) prepared as a stew or in groundnut/simsim sauce.

Besides crop enterprises, Teso region also engages in animal rearing and the major animal enterprises kept in the region have been ranked in order of prevalence among households. The table below presents a summary of the livestock kept by households based on prevalence;

Table 3: Livestock enterprises kept

Enterprise	Food security	Income insurance[7]	Social insurance[8]	Economic Insurance[9]
Chicken	✓	✓	✓	
Goats		✓	✓	
Cows		✓	✓	✓
Sheep		✓	✓	
Pigs		✓		
Ducks	✓			
Turkeys		✓		✓

[7] **Income Insurance:** The term in the study context is used to mean a ready source of income in emergencies situations where other household assets and agricultural products cannot be liquidated at short notice, usually within 24 hours.

[8] **Social Insurance:** This refers to the ability to respond and contribute towards social events in the community such as hosting guests, participating in social functions like marriage, naming ceremonies and other community rites.

[9] **Economic Insurance:** This refers to income needs of the household relating to major events that have significant economic implications to the future cash flows of the household such as the need for investment capital, need for education finance at post primary and tertiary levels and acquisition of productive household assets like land.

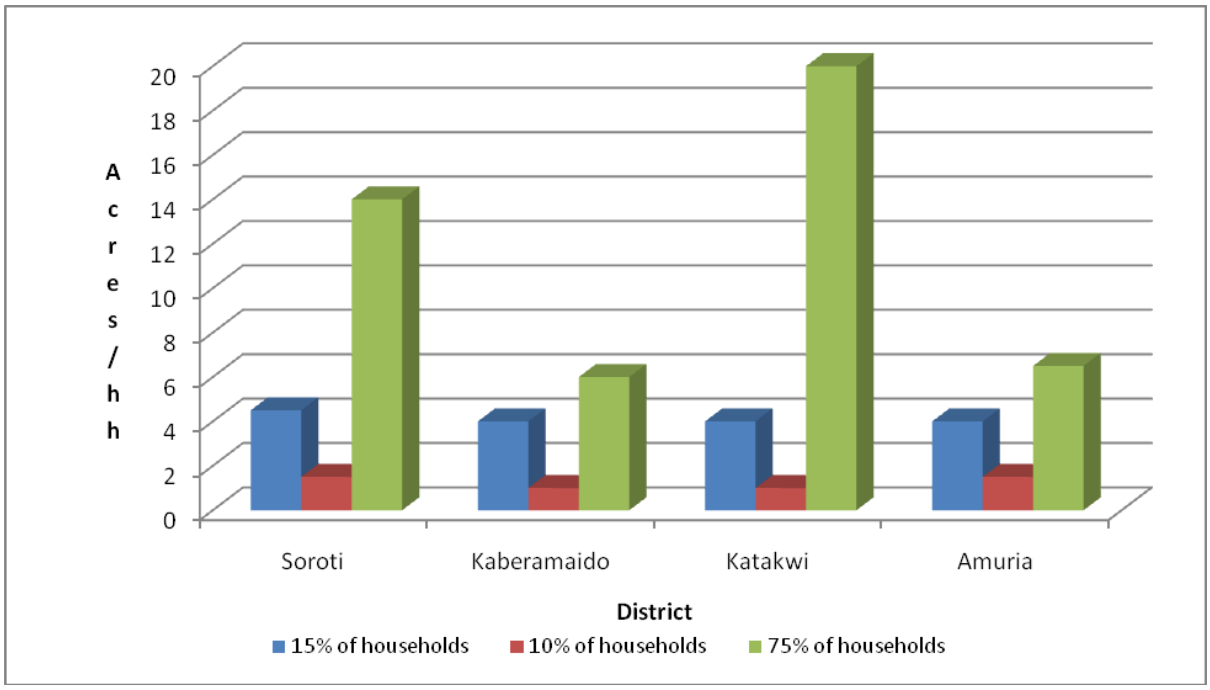
- Chicken constitute the ready income source for household income for emergencies and also food security
- Goats and sheep provide income and social insurance, i.e. used for many social events and ceremonies
- Cattle and its products provide economic insurance for the household
- Turkeys and pigs are entirely reared as an income generating activity; they are sold as soon as they reach market weight.

3.1.2 Agricultural production levels in the Teso region

Acreage

The focus group discussions revealed a drop in the amount of cultivated land which has directly impacted on the total production output in the region, the average acreage cultivated per household in 75% of the households in the region during the main rain season was 4 acres. Ability to cultivate more acres was limited by the use of the labour intensive and less efficient hand hoe and the short rain spells. Labor constraints were particularly significant in Amuria and Kaberamaido districts where land was still available for expanding farming activities, but labor was a major constraining factor. Other factors which have limited increase in acreage and productivity as a whole are; limited levels or lack of farm financing to acquire inputs, short rainy spells and rainfall variability. The household acreage was clustered into three tiers i.e. modal tier average which represents the majority average, upper tier average and the lower tier average and is shown in figure 1 below.

Fig.1 Average acreage cultivated per household and the proportion of households involved in the main rain season



KEY TO GRAPH COLORS: Modal tier average Lower tier average Upper tier average

The proportion of households across the region that are able to cultivate at least 6 acres during the main rain season is estimated at 10%. This represents the upper tier and within this upper level tier the household with the highest acreage recorded was 20 acres in Katakwi and Soroti districts. Generally the majority of the 10% in this bracket averaged 11.5 acres, with Soroti and Katakwi districts averaging 14 and 16 acres per household in this tier respectively. We also noted that the households operating at this level are commercially oriented households using ox-ploughs to open up land and producing mainly groundnuts and cassava for the market besides producing food to provide for the household food needs. The 15% of the households with an average acreage of 1.5 per household represent the very poor households in the region often dominated by the elderly couples and widows of advanced age who can not remarry or cohabit. The majority 75% represent the average household in the region using predominantly family labour to open land. The majority of this category have access to or own oxen which are shared among the household to plough up the land. Besides sharing the oxen, they also have self help groups that team up to do communal digging in a rotational arrangement among the member's fields. The communal digging is how the communities have adopted to the use of the hand hoe for opening up land since the ox-plough is not enough to go round and open the desired number of acres for each of the households.

…….Usually we work in groups starting from opening of land, weeding to harvesting. Even those who have ox-ploughs still work in the communal self help groups because they do not have enough manpower, to plough, weed and harvest …… ***Mr. Emuria Nelson-0779732809 Awaliwal Gweri -Soroti***

Estimated levels of production of selected crops in the Teso region

The total output for the major enterprises listed above were also assessed, table 4 below shows the estimated output levels for each of the enterprises and ranking according to total output expressed in terms of metric tonnes, proportion of the national output and the ranking in the Teso region.

Table 4: Estimated Production Quantities of key crops grown in the Teso Region

Crop	Estimated Production from the study region (Mt)	% of national Production	Production Ranking[10] in the Teso region
Cassava	495,839	11.1	1
Maize	141,027	11.1	2
Sweet Potatoes	85,778	3.3	3
Sorghum	85,503	19	4
Ground nuts	55,946	34	5
Beans	19,599	4.5	6
Millet	19,071	2.5	7
Rice	16,133	9.8	8
Cow Peas	14,130	n/a	9
Sesame (Simsim)	10,579	17.3	10
Green Gram	6,230	50	11
Bambara nuts	2,576	n/a	12
Soya Beans	2,163	1.2	13
Onions	Negligible	n/a	n/a
Tomatoes	Negligible	n/a	n/a

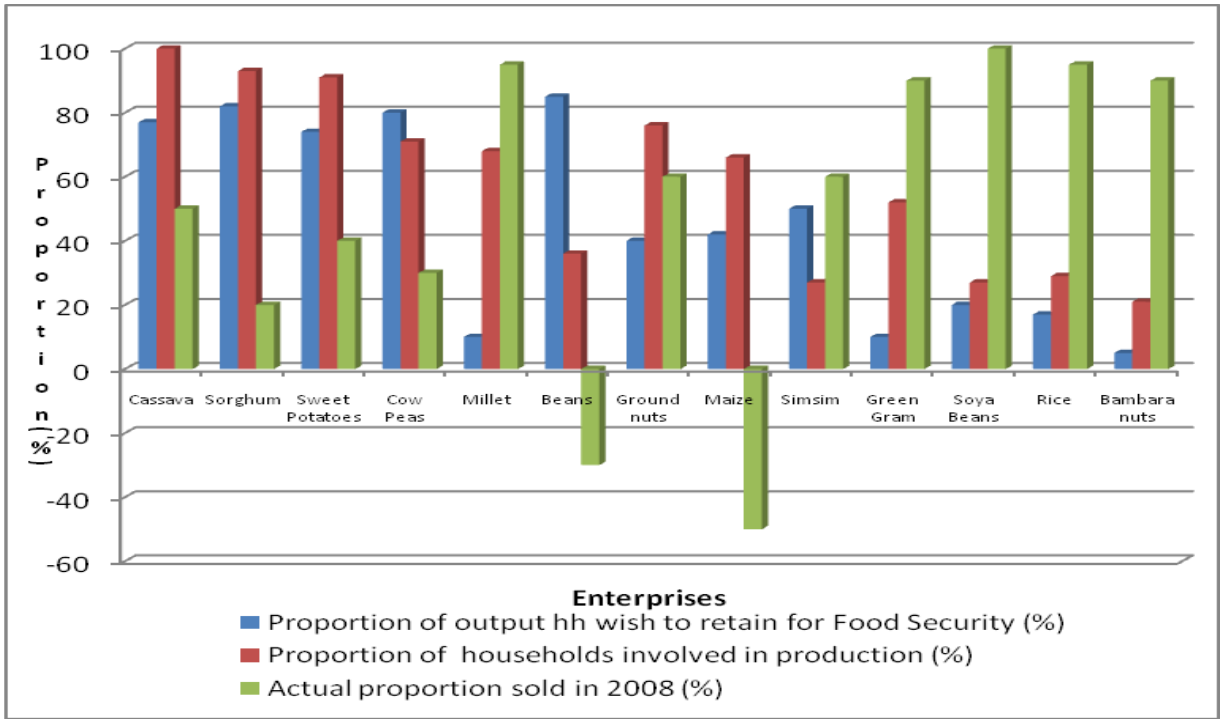
FAO STAT 2008, Consultants Field data 2009

[10] The ranking is based on production quantities

Table 4 shows that the most produced crops in the Teso region are the category one staple foods, produced to meet the household food needs. These are cassava, which represents 11.1% of the total national production, followed by maize which also accounts for 11.1% of the national production, sweet potatoes, contributing 3.3% to national production and ground nuts contributing 34% of national production. The region is the leading producer of green gram, and contributes half of the total national production. Rice is also an emerging crop in the sub region, with a national contribution of 9.8%. Other crops produced with considerable national contribution include simsim and millet.

It was ascertained during the field visits that production of millet is on a tremendous decline and it has lost its position as a staple food crop and is now relegated to a commercial crop with its place being taken by cassava and sorghum. Historically millet was the number one staple food in the Teso region. On the other hand, while maize has been grown for decades in the Teso region, it was grown as a back yard crop around the homestead for roasting around a fire chat in cold evenings. It has only become a field crop in the recent past. Most of the staple foods and oil seed crops are retained within the households for food security. Figure 2 below highlights the proportions of the various crops that are retained for food security.

Fig.2: Proportions of crop output that are retained for food needs & proportion of households growing each enterprise



Source: Consultants field data & Uganda National Household Survey, Agricultural Module 2007

Figure 2 above shows the main crops farmer are growing and the proportion of each enterprise that the farmers wish to keep for household food needs. The graph also shows the actually quantities farmers sold in the year 2008. The most dominant crops farmers prefer to keep for household food security needs are; cassava, sorghum, sweet potatoes, cow peas, beans and groundnuts respectively in their order of significance and role in household food security as listed by the farmers. The proportion of the households growing each enterprise as shown underlines the importance of these enterprises to the household food security. At least 80% of the households grow these (cassava, sorghum, sweet potatoes, cow peas, beans and groundnuts) crops. One concern from figure 2 above is the fact that farmers actually sell over and above what they are willing to sell, taking the case of cassava which is the number one food crop for example; households sold 27% more cassava than they would have wished to sell last year. For crops like beans and maize flour, farmers had to purchase 45% and 108% more in addition to what they produced. These findings point to lack of a household surplus which can be sold. This means the sales of produce does not improve the welfare of the households but makes them more vulnerable to food security problems since what they sell is what should have kept back for food.

Enterprise Classification

Food security

The farmers were also asked to rank the above crops in order of their food security significance and order of choice when prioritizing the crops to plant. The purpose of this activity was to identify the crops that farmers consider central to their food needs. The order rankings and classification was done as highlighted table 2 above;

Table 5: Classification and order Rankings of the major enterprises on basis of food security priorities

Staple foods (category one)	Sauces and toppings (category two)	Supplementary category three
Cassava	Peas for the leaves (Eboo)	Tomatoes
Sorghum	Sukuma wiki, Dodo, ecadoi	Egg plants
Potatoes	Beans	Rice
Maize	Groundnuts	Simsim
*Millet	Cabbages	Green Gram
	Cucumber	Fruit trees (Citrus, mangoes, Pawpaws, Jack fruit)
		Bambara nuts
		Bananas
		Yams
		Pumpkins
		Green pepper

In a typical season during the main rains, farmers allocate farmland and time first to category one crops primarily for food security reasons, however these crops also have an advantage to the farmer over the other crop categories because they have a ready market from households that cannot meet their food needs out of farming especially in the urban and peri-urban settlements. Farmers are therefore able to assure their food needs through these crops but in the event that there is an urgent need for cash, they are easily sold because of the ready availability of the market. Category two crops with the exception of groundnuts are often planted in the second season rains which are short and sometimes unreliable. The primary objectives of these crops is for household food needs, they tend to have small or even niche markets and are not readily marketable (sold at short notice) when a farmer is in urgent need of cash. Most of the crops in category three are either grown in the second season or intercropped with category one crops in the main season. They are primarily grown for their high commercial value and are highly priced in the market which earns farmers better revenues. However when farmers fail to sell or find markets for these crops they are used to supplement household food needs usually to replace any proportion of the food security crops which get sold to meet urgent cash requirements because they are readily marketable. Category three crops therefore besides their commercial purpose act as fall back sources for meeting household food needs.

History and experience in the cultivation of the enterprises identified

The farmers were asked to categorize enterprises according to how familiar they are with the agronomic practices, technologies, identification of pests and diseases and management of these pests and diseases for each of the enterprises, listed above. The purpose of the exercise was to assess the implication to the learning curve of each of the major crops currently grown in the Teso region. The time that the enterprise was introduced into the region was considered as an important indicator that influenced the learning curve. The assumption is that new technologies relating to crops with a long traditional history in the region are more likely to be adopted with ease and in a shorter time than in the case of those crops recently introduced:

Table 6: Traditionally grown crops (since birth)

Staple foods	Sauces and toppings	Supplements
Cassava	Peas (Eboo)	Simsim (Sesame)
Sorghum	Cucumber	Green gram
Potatoes	Groundnuts	Bambara nuts
Millet*	Assorted vegetables	

According to the farmers, the crops above were grown by their fore fathers and handed down to them over generations.

Table 7: Crops introduced in the last 15 years

Staple foods	Sauces and toppings	Supplements
Maize*	Beans	Tomatoes
	Cabbages	Egg plants
	Pigeon peas	Fruit trees (Citrus, mangoes, Pawpaws, Jack fruit)
		Pineapples
		Soya Beans
		Onions
		Bananas
		Green pepper
		Carrots

**While maize has been grown for decades in the Teso region, it was grown as a back yard crop around the homestead for roasting during a fireplace chat in cold evening. It has only become a field crop in the last five years in most parts of Teso.*

The history of cultivation of these crop enterprises is recent in the region and there is not sufficient historical knowledge and experience in the growing of these crops. This category of crops was introduced between 1-15 years ago in most of the Teso region. Farmers are not yet familiar with the agronomic practices related to these crops and may have difficulties adopting technologies relating to these enterprises. The learning curve has also been affected by the disruptive life of the communities living in IDP camps due to insecurity in the region. The lack of experience will most likely prolong the learning curve in any intervention process leading to technology adoption by the farmers in relation to these enterprises.

3.1.3 Production technologies applied in the Teso region

The Teso farming system is agro-pastoral with rural communities heavily dependent for their livelihoods on subsistence mixed farming involving crop and livestock production. It is a unique system, principally due to the historical predominance of ox-plough technology in the region for land opening prior to the late 1980s before insurgency deprived the region of all its livestock especially cattle. The Teso region has been affected by war and civil disturbance as well as cattle rustling from the Karimojong worriers up until the mid 2005. Since 1987, the people of Teso have lived in IDP camps making these the first and longest ever existing IDP camps in the country. This period destroyed the agricultural sector which formed the economic base for the region, which made Teso once a major food basket for the country. Many animals died during the 20 years of insurgency when many families were displaced from their homes, leaving the animals without care (like food, water and drugs) as the owners were condemned to living in IDP camps. Cattle rustling from the

Karimojong worriers depleted the region's stock of the oxen. Today the population in Teso is trying to re-invent itself and adjust to agriculture using rudimentary hand hoe technologies to open up land for agriculture, efforts to restock have for long been frustrated by the persistent cattle rustling from the Karimojong. The intensive of these Karimojong acts are however on the decline since the government launched the disarmament program in Karamoja giving a glimmer of hope towards restocking and restoration of the ox-plough technology.

The shift from the efficient and time saving ox-plough technology driven agriculture to the hand held hoe has significantly reduced the capacity to open land and to carry out timely planting because most households can not master the required amount of labour to carry out agricultural activities at the level necessary to compensate for the lost ox-plough technology. The hand hoe makes land opening laborious and extremely slow, the effect is all farm activities like planting, weeding and harvesting always lag behind schedule resulting in yield loss. In addition, the shift led to reduced cultivatable land, further contributing to reduced crop production. This is because the hand hoe can only cover small areas, and few farmers can afford to hire labour for weeding and land opening because labour prices rise during periods when demand is high, besides there are few persons willing to hire out labour.

Farming methods used in the sub region are mainly subsistence, with minimal use of pesticides and fertilizers. Farming generally is geared towards meeting household food needs. This is in part explained by the fact that families are in the process of being resettled back in their homes and the immediate concern is food security. To increase cultivatable land and production, farmers come together to carry out communal digging to contribute agricultural labour to one another as an alternative to cash hire of labour. They dig for one person and move to dig for another in a rotational communal basis (communal labour). This is done for activities like weeding and harvesting which needs to be completed as fast as possible, to reduce yield loss and compromise quality of the produce.

3.1.4 Production structures

Production unit

The main unit of agricultural production in the Teso region is the household. Land ownership is customary and each household has an allocated portion of land to farm which is passed on from father to son down the generations. Women cultivate this land and in polygamous families each wife is allocated a portion of the husband's land inheritance as hers to farm for as long as she remains a

member of the household even if they are widowed. The cultural norms protect the right of the widows to farm the land allocated to them before the death of the husband, however, focus group discussions revealed that the break down in the clan (social) structures that upheld these tradition following over 20 years of disrupted lives in camps have exposed the widows to the injustices of land grabbing from the relatives of the husbands when the husband dies and she has no grown up children male or female. The female children are equally entitled to cultivate the land until they are married off or the mother dies and there is no male child in the household. Under such situations the female children become vulnerable to losing the inheritance. Traditionally the majority of farm land is allocated to the women who have been responsible for food production while the men reserved a few acres of land for commercial crops like cotton. The growth in population especially in parts of Soroti and parts of Katakwi districts such as Toroma and Omodoi has increased the level of land fragmentation and reduced the amount of land available for agriculture per household especially in the densely populated areas like Gweri, Parts of Serere in Soroti and Toroma in Katakwi. But in general there is sufficient and unexploited public land in the Teso region for agricultural activities. This customary land tenure system favours the smallholder subsistence agriculture system which is oriented towards food production. Less than 1% of the population is engaged in commercial agriculture (i.e. producing for the market) as a business, the rest produce for household food needs and only sell if there is surplus produce or a household emergency which requires cash. One of the farmers who cultivates about 20 acres in Toroma; Mr. Opesen stated that ''his primary objective is not farming for the market but engages in farming as a tradition and to ensure self sufficiency, however, he always sells the excess to generate some income which uses to renovate his homes, educate his children and help relatives''. It was clear he does what he does because he has the capacity and for personal pride rather than commercial drive. Such is the sentiment of farming in the region since time immemorial, underlining the efforts needed to transition from food driven agriculture to market driven. Commercial farming was perceived from the context of traditional cash crops like cotton most of which are on the decline.

Production support structures

The government's National Agricultural Advisory Services program which is part of the government's strategy to modernize agriculture in Uganda has been active in the Teso region. NAADS has organized farmers to work in groups around specific enterprises selected for NAADS support. However, these groups have never been coherent enough to help the farmer households harness the benefits of group influence in marketing and production. In spite of NAADS attempt, groups are still not viewed as production units but conduits for receiving aid and inputs from NAADS and other

development organizations after which each household reverts back to their individual production status and working through self help labour driven groups. However there was evidence that under Africare some self help labor groups are now transition into stable associations that can be developed into viable production units.

> "It is Africare which came and organized us into groups and is training us and then gives us seeds to plant, before we did not have groups but just registered ourselves when NGOs have brought some things or to get seeds from NAADS". **Ms. Apolot Betty 0756262892 Kateta Serere- Soroti**

The Community based Organizations are equally trying to promote the group approach to agricultural production. In all cases the group formation lacks a clear strategy and long term objectives. Our group identified this as one of the factors undermining group coherence and ability to organize production around and position the farmer groups as the main production units through which farm productivity can be increased, market access and linkages improved and commercialization of potential enterprises can be achieved.

One of the major constraints to market access is the inability to produce sustainably marketable volumes; this is prerequisite to attracting credible and profitable buyers of agro-enterprises. Individually the farmer's ability to produce is constrained by inability to access high yielding seed varieties, high costs of inputs due to low individual quantities purchased and individual marketing which increases the transaction cost in procurement of produce by the buyers from farmers, a reason why bulk buyers shy away from buying directly at the farm gate. One of the best ways to create these volumes and develop production and marketing economies of scale is through aggregation of input needs and outputs produced at household level and adopt collective marketing approaches.

The household, which already have been identified as the main agricultural production unit in the Teso region, is the basis of intervention by Community Based Organizations (CBOs) and NGOs. These CBOs and NGOs provide the mobilization and advocacy support to lobby for local government services, supplement government development and service delivery efforts through direct program interventions at the household level, aimed at increasing food security by improving agricultural productivity, through provision of advisory services and infrastructure development. The role of the central and local government has been to provide an enabling environment and to date the central government is rehabilitating the

Soroti-Lira highway, which will ease transportation of agricultural produce and reduce risks and costs of accessing the markets in the northern parts of Uganda and the export markets of Democratic Republic of Congo and Southern Sudan. The government also finances technology development and transfer activities including funding the privatized farm extension activities in the sub region. Some of the organizations sited in these roles are listed in table 1.

The Private Sector is the other most important player in the process of agricultural development in the region; the private sector includes the smallholder subsistence farmers, traders, processors and produce buyers, buyers' agents and middlemen who play the produce consolidation role. However, the middlemen carry out the consolidation roles in a disruptive manner characterized by speculative trading which distorts the commodity markets, increase transaction costs along the value chain and promote dishonest trading practices in the region resulting in low farm gate prices for the farmers.

''…….We take our produce to Arapai market where most of the traders come, but we do not trust them because some of them manipulate their weighing scales and under weigh our produce, sometimes when weighing the produce somebody fixes a foot underneath the bag to reduce the number of Kg displayed on the scale. Because of this sometimes we farmers also adulterate the produce with things like sand to get extra kgs and compensate for this kind of thing. As a result for us here if you have something substantial to sell we prefer going directly to Soroti town, but those who can't have no choice but to deal with these people'' **Abocu Simon Peter 0779037670-Gweri -Soroti**

It is our considered conclusions that market driven interventions should redefine the role of the middlemen by organizing the farmers directly to do the primary consolidation through collective marketing. This will reduce speculative trading, improve market information flow and leverage the farmer's capacity to negotiate better farm gate prices.

3.1.5 Post Harvest Handing Methods, Processing and Packaging

Generally, the field visits established that there is little value addition done to the produce, most of the value addition efforts focus on primary value addition such as drying, cleaning and storage, except in the case of maize, cassava, sorghum and millet where besides drying

production of flour from enterprises and local alcoholic beverages are produced as secondary value addition processes. Most of the flour conversion is done using local mills set up by rural entrepreneurs; the flour is sold in the local community markets. The major buyers of this flour are the local food vendors and brewers who produce the frosty beer "Ajon" and the local gin (Waragi). Milling at a larger scale occurs in the urban centers of Soroti and Mbale where most of the Maize and cassava is purchase and transported for milling by the commercial traders who then package it in 100kg polybags. Shelling of groundnuts is done manually or by use of locally fabricated shelling machines. Millet, sorghum and simsim are usually threshed after drying and packaged in 100kg bags for sale or storage. Besides shelling groundnuts and sesame are roasted and used to produce peanut and sesame butter though at a very small scale.

The table 8 below highlights the post harvest handling methods, processing and packaging of key crops grown in the Teso Sub region.

Table 8 Post harvest handing methods, processing and packaging of key crops

Crop	**Post Harvest Handing Methods, *value adding processes and methods and Packaging***
1. Cassava	• In the past cassava was harvested fresh and could be preserved for 4-5 days by burying under ground and moistening the spot by sprinkling water once each day. • The cassava tubers are harvested, peeled and sliced into chips which are dried directly under the sun • Varieties with high cyanogenic content are peeled and fermented for 3-5 days to allow the hydrolysis of the cyanogenic compounds and then dried under the sun • The dried cassava chips are stored and sold to the millers or pounded into flour, and consumed at the households as the basic daily source of dietary energy. In some instances it's consumed fresh. • Drying and converting the cassava into flour considerably increases its shelf life, for food security and income generation (for the cassava does not have to be sold fresh, even when prices are unfavourable).

	• The local cottage industries consume a large proportion of the dried cassava for brewing and distilling local potent gin. • In Uganda, the use of quality cassava flour as a raw material for processing into secondary products such as biscuits and noodles, by the private sector is picking up. • Future prospects may consider the extraction of commercial starch from cassava as well as production of a variety of cassava based products.
2. Maize	• The fresh maize is eaten in many areas of the country, green or roasted on the cob • The maize cobs are harvested and dried in the sun from which the seed is extracted from the maize cobs and packaged in polyethylene bags. • The dry maize is processed by dry milling techniques to give a relatively large number of intermediary products, such as maize grits of different particle size, maize bran, maize meal, maize flour and flaking grits. • The maize flour is packed in sacks of 100 Kgs and sold in shops in all the major towns. • The maize bran is used for making livestock feed
3. Sweet Potatoes	• The potato tubers are harvested and sliced into chips which are dried under the sun and stored as dried chips called ''Amukeke'' to be used for household food needs. • Fresh tubers can be harvested and preserved by storing under ground for a period up to 5-7 days, the soil is kept moist by watering at least once each day. • Cooked or roasted when fresh and eaten as a main dish or a breakfast snack • Packed in sacks when fresh, and sold in major markets in Kampala •
4. Sorghum	• Harvested and dried before it is stored in the granary or threshed to produce grain and stored in the house in polyethylene bags. • Ground into flour and mixed with cassava for domestic consumption • The flour is also used by the local brewing industry to brew the local beer ''Ajon'' or as an adjunct for making the local potent gin ''Waragi''
5. Green	• The pods are harvested and dried under the sun before the pods are crushed

Gram	to release the beans • In Teso the bean is boiled and eaten whole or split, boiled and prepared into a thick paste like dish call “edek” in Ateso. • When dried and pounded, the flour is used as a beauty product to maintain the skin complexion, and as a detergent in times of scarcity (when soap or detergents are not available or the cost is beyond the reach of the rural poor). In some instances it is soaked in water for a period of about 12 hours and the water is used for medicinal purpose to treat a wide range of fevers.
6. Ground nuts	• The pods when harvested may be cleaned cooked, roasted and eaten as a snack, or sun dried and stored in granaries or bags. The dried nuts can be shelled roasted (salted or unsalted) and eaten, or crushed into paste called peanut butter (produced in the cottage industrial setting). The peanut butter is used in many local dishes or is packed in plastic containers of weights ranging from 250 grams to 1 kg for sale. The paste when protected from impurities has a shelf life of over 6 months. • The packaged butter appeals mainly to the middle elite usually working corporate professionals who use it as a substitute for butter or margarine on bread In communities outside Northern and North Eastern region the dry seeds are pounded (using grinding machines), into ground nut flour which is used to make a delicious traditional soup. The flour is packed in sacks of 100 Kg and sold in all the major markets. • Rural households in Teso extract the oil and use it as a skin care product especially for babies
7. Rice	• Rice is hauled, cleaned and packed into sacks of 100 Kgs for sale. It is consumed as a staple food by mainly the urban households in Uganda, making it a high value commercial crop Milling is normally done in the urban centres especially Soroti and Mbale towns.
8. Millet	• The dry millet is processed by dry milling techniques to millet flour which is mixed with cassava for an energy base in household meals across the country. • Used in recipes for preparation of infant feeding formulas

	• It is also widely used in the local brewing industry to produce a popular local frosty alcoholic drink called "Äjon" in Ateso. • The millet flour is packed in sacks of 120 Kgs and sold in shops in all the major towns.
9. Sesame (Simsim)	• The seeds are sun dried and roasted and prepared into sesame butter (paste) to be consumed at the households part of as a substitute to peanut butter in the traditional dish recipes • The dry seeds are packed in sacks and polythene bags for sale for making confectionaries and animal feeds • The raw seeds are crushed to extract oil. The new sesame seed varieties contain approximately 48-50% edible oil. This is mainly done in cottage industries
10. Beans	• Cooked fresh from the garden (after being removed from their pods) as sauce to provide the protein base in household diets. • Mainly, the pods are dried, the beans extracted and again dried to extend their storage life • Dry beans are packed in sacks of 100 Kgs and sold in major local markets within the sub region.
11. Bambara nuts	• Fresh seeds are usually boiled and eaten as a snack. • Sun dried seeds are roasted and crushed then used in various dish recipes, or sold for income. • The dry seed for sale is packed in sacks of 50 Kgs- 100 Kgs. • The leaves, stocks and other crop residues are rich in protein and phosphorous, and very palatable to animals making it ideal for preparation of livestock fodder
12. Citrus	• Oranges are locally eaten fresh (out-of-hand or as juice), and consumed especially in warm climates. • The fresh oranges are sold to industries like Britania and Jakana (in Uganda) to process oranges to produce packaged orange juice.

3.1.6 Major Production Constraints to Agricultural in Teso region

- **Poor infrastructure:** Teso region has a good feeder road network; however, most of these roads are in a deplorable state which renders them impassable and increases the costs and risk of produce transportation. Value addition initiatives are also constrained by poor supply of utilities, high utility prices, there is also a poor distribution of water bodies which also makes it difficult to develop irrigation infrastructure which will be a critical requirements to boost agricultural productivity in wake of rainfall variability due to the effects of climatic change. The GOU has taken a deliberate course of establishing irrigation infrastructure across the country as part of government's effort to mitigate the effects of climate change, availability of water bodies will be critical to realizing this goal. Opportunities for value addition and processing industries will mainly depend on availability of sustainable farm production to produce sufficient raw materials to sustain any industries and attract investments in this area.
- **Low levels of savings and constraints in accessing financial services needed to develop agriculture**: Limited opportunities for financing farm production investments in the region which is also a similar case for the rest of the country. There is no specific programs lending to farmers in the rural area, SACCOS have been formed and promoted by government to bridge the financing gap and promote savings, but farmers have largely shied away from them due to past experience with the ''Entandikwa'' fund which has resulted in low memberships at the SACCOS and rendered the rural based SACCOS non-viable. Lending rates are equally exorbitant averaging 30% per quarter. **A case of** Toroma SACCO which has a total saving of UGX 8m over three years and membership of 500 with a lending rate of 10% per quarter highlights the plight of SACCOS.

- Nationally agriculture has not received its rightful share of commercial credit, despite its contribution to the economy. By March 2009, for example, the lending by commercial banks to agriculture (production and crop finance) stood at a mere 5.3% of the total lending assets to the private sector[11]. In addition, according to the FinScope Study (2007), 67% of the population in Eastern Uganda is unbanked. The problem is exacerbated by the high levels of poverty in the region which averages 60.3% in Teso

[11] Background to the Budget 2009/2010, MoFPED

compared to the regional average for eastern region which is 46% and national average of 31%[12], which has reduced the ability of the farmers to procure improved seeds and appropriate farm technologies needed and levels of adoption and scaling up of modern farming systems and technologies needed to increase agricultural production.

……We have some SACCOS here but we can not get money from them anymore, the memories of ''Entandikwa'' money are still fresh in our minds, we lost our husbands and became like widows since the men had to run away because we failed to pay back the money due to crop failure, in the end we lost more, our little household properties are were taken and we were left worse off than we were before….. **Acom Ana Grace -. Kateta –Serere Soroti**

- **Inability to access and afford quality farm inputs:** The use of fertilizers, herbicides and pesticides is limited or entirely nonexistent among the farmers. Farmers identified two factors for the non usage; The high costs of inputs (including costs of recommended seeds, fertilizers, pesticides, oxen-ploughing harrowing, chiseling, planting, spraying, harvesting, shelling, and transport to stores) which makes them unaffordable to the smallholder rural farmers without alternative sources of financing. Secondly even farmers that wish to procure some of these items are unable to access them due to non availability in the local input stores hence requiring long travel to either Soroti or Mbale town to buy them. The transport cost then escalates the final cost of the input. Access to inputs has been constraint by three aspects; high input costs, non availability of the inputs and lack of savings & investment capital to purchase the improved seed and other farm inputs needed to boost production. These factors plus others have affected the quality and timeliness of farm operations such as the land preparation. To manage costs, farmers have resorted to saving seeds from the previous harvests for planting, as opposed to buying new and more vibrant seeds that are high yielding and more resistant to disease. In addition, there are some low priced counterfeit and poor quality farm inputs which are used to dupe the farmers on the market.

[12] UBOS Statistical abstract 2009

……. We all wish to use these things because we used to use them regularly in the 1970s and early 1980s especially with cotton and groundnuts because the cooperative societies used to bring them near to us and even give us on loan, but now they are not available here and if you wanted you must travel to a big town like Soroti or Mbale to get at least fertilizers or crop medicines (pesticides & herbicides), even transport itself is very expensive which makes it even more expensive and un affordable for us, it is only those people near to the town that maybe can use those things, even buying new seed for us is too expensive because of the distances we have to move and the ones they bring to us like ''Sekido sorghum'' and others in village markets here I think they are fake because they always fail, so most of us rely on retained seeds because we don't trust some of these improved seeds they sell in our markets. **Aluma Albert -Orungo - Amuria.**

- **Use of inefficient farm technology.** While a lot of appropriate and cost reduction and productivity enhancing technologies have been developed especially from SAARI, the transfer and adoption of these technologies have lagged behind. Several factors already highlighted above were sighted by the farmers for this, in addition the increasing reliance on the hand hoe for land opening has had serious implication to labour availability which has created a major impediment to technology transfer and adoption which according to farmers involves a process of experimentation and risk While the hand hoe has been an integral part of the Teso agriculture, the reduction in the use of animal draught in farming has made it an impediment to adoption of improved technologies

…….Many times we are competing with the rains using the hand hoe, it takes time to clear one garden , it is easy for us to first plant and use methods we are used to and by the time we would like to try new things either the rains have stopped, we are tired or the time has passed……**Esilu Patrick Pingire Serere**

- **Post conflict challenges:** Insurgency in the sub region led to insecurity and displacement of over 100,000 people confined them to IDP camps, especially in the districts of Amuria, Katakwi and Soroti, so they could not attend to their gardens. People are now in the process of resettling back in their homes but agriculture activities will take a while to pick to even the full potential of the hand hoe.

…… ''Most of the people spent their time leaving in camps, and are just now coming back home to start up life afresh after more than 20 years leaving in the camp, they have new challenges, having to start up a home afresh, clear bushes and fields which have grown into forests, and have no properties, they are just beginning a new home with nothing, in the camp tey depended on hand outs and could not own property''. **Mr. Ogwara Julius key informant Obalanga -Amuria**

- **Weak extension services delivery structures:** Extension services are necessary to raise the awareness of the farmers of new and existing technology, improved seeds and farming methods, and support the process of technology transfer and adoption by the farmers in order to raise agricultural productivity. While there are service providers in each sub-county under NAADS, these tend to be limited to specific enterprises selected under NAADS, secondly they lack the necessary facilitation to reach farmers that are further away from the center

> **…**……the only training we have received is from Africare , we have NAADS but it is only those people who are registered in the NAADS groups that we hear are normally called for training……. **Mr. Opio Martine – Awaliwal Gweri-Soroti**

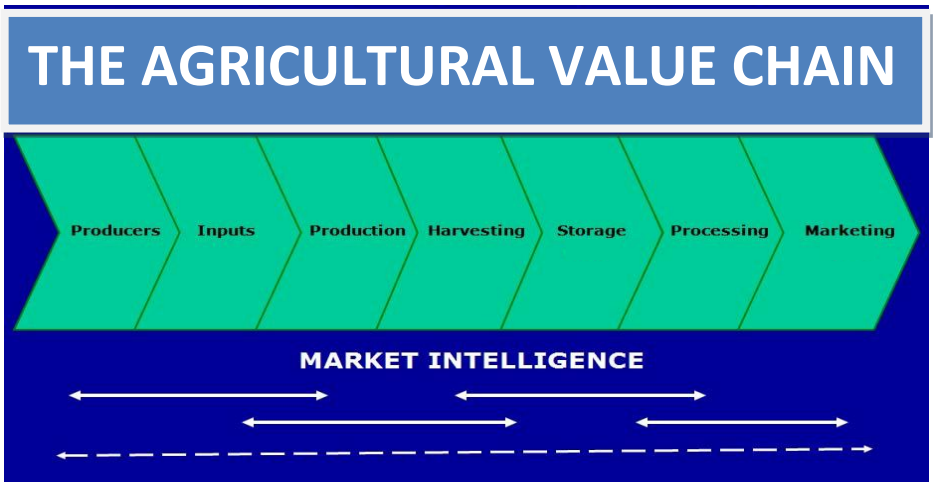
- Plant diseases, especially cassava mosaic and groundnut rosette, have affect the crops and greatly reduce the yields.
- Many rural farmers are predominantly smallholder subsistence farmers; mechanization through the use of tractors is constrained by the fragmented nature of the farm lands.
- The return of people from the IDPs has also resulted in an escalation of land based conflicts and increased land fragmentation which is affected land availability and accessibility for commercial agriculture[13].
- Poor capacity in weather monitoring and forecasting, effects of floods and other weather related factors, which compromise productivity and quality
- Low market prices and returns, that are a disincentive for the communities to continued production

[13] Obalanga, Orungo and Kaberamaido are exceptions

- Cattle theft. While mass rustling of cattle by the Karimojong has been checked, cattle theft by the Karimojong warriors especially at the boarder areas of Amuria and Katakwi are still rampant and discouraging any efforts of restocking and especially acquisition of oxen. This has denied the population of cattle which provide milk, meat and cash income. They also deny them the ox labour for land preparation as ox-ploughing is was major component of agriculture practice in the region.

3.2 Market and marketing Aspect

Marketing aspects, in this study, refer to all activities undertaken by the agricultural households/ producers, buyers/ dealers and all market actors to get the produce to the final consumers. In undertaking these marketing activities, all the actors in the agricultural market value chain aim to avail the final consumers with good quality farm produce at the best possible price. Activities that fall under the market value addition chain include; produce bulking and packaging, transportation to the markets, access to market information, access to finances and support services. Whereas these market value additions activities may imply it is a private commercial activity involving farmers and traders, there is nonetheless a role for actors like the Government, development partners, non-governmental organisations to promote development and facilitating access to the markets.



3.2.1 The Markets and Market Structures

The major markets served by Teso region are the household consumer markets in the urban and peri- urban population in the Eastern region towns of Mbale, Tororo, Malaba, Busia,

and Jinja. This market collectively accounts for between 70%-80% of the agricultural produce from the Teso region according to the study. 80% of the major produce wholesalers in Soroti and Mbale districts who were interviewed during the market survey sourced all or part of their produce stock from the Teso region. The central region market (Kampala) which accounts for between 20%-30% of the agricultural produce especially groundnuts, potatoes, dried cassava, rice and citrus is supplied by migrant buyers who come from Kampala, buy the produce and go away. These market actors tend to come to gazetted markets like Ocorimongin in Katakwi, Brookes Corner Ocapa, Arapai in Soroti and Otuboi in Kaberamaido on the designated market days. Produce to the central region is supplied to the Kampala market from where other dealers access this produce. The major agricultural produce from the Teso region marketed in Kampala include groundnuts, dried cassava, sweet potatoes, Citrus and rice. The third most important market is the community market which account for about 10% of the production from the region, the bulk of produce from the communities market enters the other market channels highlighted above and only limited amounts go to the local household demand.

The final consumers of agricultural produce in Uganda are the households. According to the Statistical Abstract 2009, households in Uganda spend about 45% of the total household income on food, beverage and Tobacco. The proportion of the poor population still remained relatively high with nearly 799,000 in the Teso region and 10.23 million people nationally (about 31% of the total population) living below the poverty line. This therefore implies that the household markets consist of mainly low income consumers. This low income market segment has the following characteristics;

- Limited demand for high value agricultural products
- The low purchasing power means markets do not get sufficient incentive for value addition and quality improvements to fetch higher produce prices
- Limited demand for value added or processed agricultural products
- High potential for the displacement of local agricultural products by cheap food imports from other regions such as the case of maize flour, beans tomatoes and onions.

The industrial and export markets account for a very negligible percentage of the agricultural produce from the region. This market potentially presents a very good opportunity if production levels are improved to sustainably meet the demands of this market segment. The citrus sub-sector where there are currently an estimated 2 million trees is beginning to attract industrial investments into the region but will need to be stepped up to sustainable level to ensure continuous supply of crushing material and justify investment in juice extraction. The current efforts and feasibility studies coordinated by NAADS and farmers structures are intended to facilitate investment in a processing plant to be located in Soroti.

3.2.2 Market Segments, distribution channels, sub-sector maps and Price trends

A Market segment is a group of people or organizations sharing one or more characteristics that cause them to have similar product and/or service needs. In this market study, the following agricultural produce market segments were identified;

1. The Domestic/ National Market which consists of
    - The low income urban and peri-urban households
    - Medium income urban and peri-urban
    - The high income urban and peri-urban households
2. The International/ Export Market
3. The Industrial market
4. The rural household market

From our market study, it was noted that the Teso region mainly serves the domestic market. The market study thus focussed on this market segment with the objective of establishing how produce flows from the farmers to these markets and how other market actors working with the rural farmers can penetrate these markets and increase access to these markets for the farmers by strengthening their position in this market segment.

3.2.2.1 Market Outlets

The following are the market outlets through which the agricultural produce from the Teso region reaches the final consumers;

***Community markets**:* These markets are held on a weekly basis at parish levels and function as outlets for local farmers, a retail market for local consumers and the first consolidation point for intermediary traders who tend to buy higher quality produce for district, urban or even export markets. They are active at least once a week; examples are Toroma, Orungo and Kateta markets.

Assembly (Consolidation) markets; are usually based in rural trading centres or villages along the trunk roads like Wera and Awoja. They function as retail markets but they are also important as assembly points from where smaller pick up trucks collect produce which is then transported to the main urban centres. Many assembly markets are open through out the week and are an important channel for emergence disposal of farmer produce.

Wholesale markets; are based in the larger urban centres where produce from smaller market traders is properly weighed and graded and sold to large-scale buyers, processors and exporters for forward transmission to the final consumer markets. Most of the buyers in this segment are located in Soroti, Kumi or Mbale towns. They also play the final consolidation role for all produce coming from the intermediary traders who buy from the feeder markets identified above.

Direct trading; also takes place where the largest traders employ agents/ hawkers to purchase products directly from farmers or community markets for delivery to the buyers' warehouses and silos. In addition, farmers in some areas have the option to sell and deliver their products to traders who run local stores. These traders bulk up products just as traders do in formal markets. These stores are mainly located in Soroti, Kumi or Mbale town and send their agents to procure farmers produce from designated centres.

3.2.2.2 Preferred (Dominant) Market channel

During the market study, the farmers expressed preference to dealing with the produce hawkers or agents of the large buyers who operate at the community or village level; moving from home to home or purchase produce at the community market level. Reasons for preferring this channel were:

a) Door to door collection services: The agents usually collect the produce from the homes thereby saving the farmers the cost and risk of having to transport the produce to collection points. They easily accepted the lower prices offered by the hawkers because of the convenience they bring to the farmer.

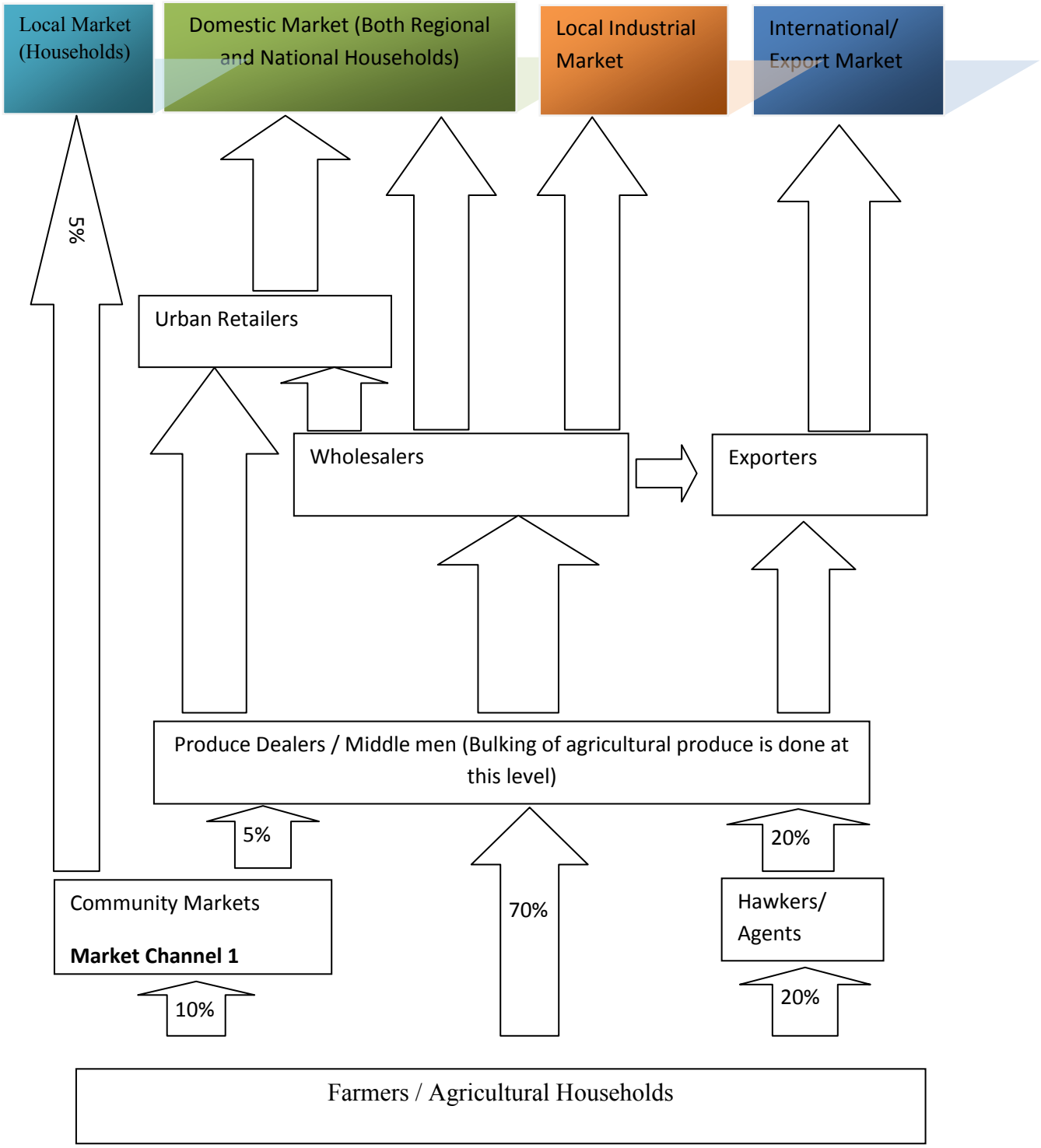
b) Guaranteed markets: These agents always buy all the produce offered to them by the farmers and establish a long term business relationships with the rural farmers. They are also available to the farmers whenever there is an emergency need for cash and are willing to advance cash in case the crop like cassava has not been harvested and dried.

c) Reduce marketing costs: The farmers don't incur any costs like transport costs to the weekly community markets and avoid the associated market taxes levied on agricultural produce on market days. The arbitrarily nature in which the market dues are levied was also reported to be a disincentive for farmers with small quantities of produce to sell in the market preferring to wait for the hawkers.

d) Ready cash: The agents very often transact on a cash basis and can be accessed although the week.

e) Have some room to negotiate prices: The farmers often have the opportunity to negotiate prices if they are offering high produce quantities which is not the case in the weekly markets where farmers are price takers.

3.2.2.3 Fig.3 Produce Marketing Channels in the Teso Region region



3.2.3 Demand Supply Analysis

During the market study, it was apparent that there still exists a demand-supply gap. All produce stocked by the major wholesalers in the urban areas are always purchased by the

retailers and other consumers. The major wholesalers interviewed in Soroti and Mbale town procured produce at least once a week from the Teso region throughout the year depending on the enterprise.

According to the earth trends statistics, Uganda imports or receives in form of food aid approximately 5.9%[14] of its total consumption. With the increasing population size coupled with rural urban migration, demand for food will continue to outstrip local production. The highly populated central region is increasingly becoming more urbanised with the population now having to depend on the other regions for its food requirements and supply. According to the Uganda National Housing Survey 2005/6, agricultural households represented 60% of the total households in the eastern region and approximate 98% of the households in the Teso region.

3.2.4 Competitive/ Comparative Advantage

The market interviews indicated the following competitive advantages Teso region has over other areas that targeted the same agricultural produce markets.

a) Cheaper prices: The produce from the region is competitive with regard to pricing. The lower prices give the dealers a good profit margin compared to sourcing produce from other regions. However, the low produce prices has two major effects to the value chain;
    - If not balanced with the correspondingly high prices of labor and other inputs, it will act as a disincentive to the farmers to produce; farmers will therefore sell at low prices for lack of choice rather than business objectives. This has already impacted negatively on production of commercial crops like cotton and sunflower in particular as farmers got biased towards food crops.
    - While the buyers of produce have the ability to preserve their margins and transfer any procurement costs along the channel to the farmers hence low farm gate price, farmers are discouraged from production and selling which affects the overall quantity of produce available for the market from the region.

[14] Agriculture and Food Uganda- Earth trends Country profile- 2003

To translate this into a real competitive advantage in both food and commercial crop production for the region, production and marketing need to be organized to reduce the production and marketing costs through collective marketing approaches that will create internal economies of scale and lower unit costs for each individual. Organizing production around production groups working collective around specific enterprises will help create production and marketing economies of scale by harnessing the power of social capital to manage the cost structure and strengthen the bargaining position of the farmers in the value chain.

b) Better quality produce: Produce from the Teso region is of a better quality especially cassava. This is in comparison to the other regions which produce the bitter type cassava and supply the same markets. However, it is worthwhile noting that this notwithstanding; other quality aspect like packaging still need to be improved. The sweet varieties of cassava are particularly preferred by the market across the country.
c) Lower transport costs: The excellent road network in the region and proximity to the great north road which provides direct outlets to Kampala, Kenya, Southern Sudan and the Democratic Republic of Congo boarders has the potential to lower costs of transportation for the major dealers normally pick up the produce from consolidation centers. Creating consolidation centers around the rural areas managed by the farmer groups as bulking centers within the proximity of the farmers will create one stop pick up points and reduce the consolidation costs incurred by the buyers which are one factor responsible for the low farm gate prices.

The major source of the comparative advantage for the region against other regions is two fold; firstly Teso region has plenty of unexploited farmland in places like Kaberamaido, Amuria and Katakwi. While soil fertility issues are a major concern across the country due to the low usage rate of fertilizers (per capita usage in Uganda is 0.21kgs, the lowest in the world) most land in the areas mentioned above have gone through a 10-20year fallow period which has replenished most of the soils. Secondly the improved security situation should provide an incentive to restore the animal draught which was an important source of transportation, labor for land opening and increased production efficiency. In the absence of alternative technologies, reviving the use of the ox-plough provides the cheapest and

most efficient technology that fits the Iteso way of life and farming system. While other technologies like the use of tractors is being advocated for, this should be carefully analyzed to assess the cost benefit and compare it with the ox-plough in terms of affordability, capacity to maintain and to adapt in the context of the high levels of land fragmentation in the region.

3.2.5 Marketing Constraints

Marketing constraints are all the challenges that limit the agricultural households and other actors from delivering the produce to the final consumers at the best price and quality. The challenges that limit access to markets of agricultural produce from the Teso region include the following:

- ***Lack of marketable surplus****:* This is the one single major constraint to marketing and access to high value markets or buyers. Failure to produce economically sustainable and viable quantities of produce limits the opportunity to attract quality buyers and enter long term supply contracts with sustainable markets like the industrial and export markets. In many cases farmers do not produce enough to meet household food security needs, what they sell does not come from surplus in the household but because of other pressures for cash needed to solve pressing household problems that require financial solutions. In figure 2 households indicated the food security needs as a proportion of what they produced but ended up selling more than they were actually willing to sell. It underlines the gap between supply and demand and the lack of marketable surplus at the household level. Because selling is conditional the households sell a small quantity at a time and cannot muster the collective selling effort that would help create bulk options and attract better farm gate prices.

- ***Few market options:*** While there appear to be several market outlet options available to the farmers in the region, the individual approach to selling and the lack of marketable surplus limits the farmer's market options to the community markets and hawkers/ mobile agents of produce dealers. This explains the preference of farmers for this channel and the challenge resulting from the fairly low farm gate prices offered for

the agricultural produce due to the high channel costs and weak bargaining position of the farmers.

- ***Low prices*****:** Some of the factors determining the farm gate prices have been explained above, however, we note that price while it is a concern of the farmers is a derivative of several factors and cannot be sufficiently influenced by any single actor. Gross margins, are more realistically influenced by the individual actors through the concept of cost management. Cost on the other is a factor of the production and operational efficiency of any value chain. We observed that rural farmers in Teso are particularly high cost producer due to high input costs, use of inefficient technologies and low productivity per acre. On the other end the costs incurred by the buyers in accessing the farmers produce and consolidating it determines the final farm gate prices they can afford to pay. These collectively impact on the farmers' capacity to invest, gross margins and the final perception of price offered by the market. It was evident in the study that farmers could not effectively articulate their production costs and therefore unable to accurately determine their gross margins. These factors as already indicated have largely explained the failure of commercial crops like sunflower which though on high demand and prices offered are competitive elsewhere but the same prices become uncompetitive in the Teso region. Places like Lira, Kalangala and Masindi have achieved significant economies of scale through organized farming groups and have increased their gross margins for sunflower and sesame as well as prices all because of cooperative actions that lowered cost accost the value chain and raised farm gate prices through market solutions rather than artificial raises which distort the market.

- ***High market dues***: While it was difficult to a certain this fact in terms of it quantitative effect to the farmers margins, the general perception among the farmers was that this levy was high, and coupled with the already low produce prices and the arbitrary way it is fixed does not take into account actual incomes or volume of produce sold, this perception is legitimate and has had the effect to keep the farmers away from community markets which should be the immediate and most accessible market channel for the farmers, In avoiding this market channel due to higher market dues

(taxes) they are deprived of an opportunity to meet better buyers and continue working through middlemen who cheat them.

- ***Lack of storage facilities**:* Many farmers lacked sufficient storage facilities that made it difficult to store harvested crops for long period. Traditionally dried crops used to be stored in granaries made from clay and straw or rids plastered with clay. These storage methods were very effective and could keep cops like millet for over five years, most of these storage technologies have been lost, abandoned or are on the decline because of increasing cases of food theft in the night, this together with the poor post harvest handling technologies, makes the produce more susceptible to damage and many agricultural households are thus forced to sell their produce during the harvesting period thereby earning low margins because of the "artificial" surplus situation created by a lot of produce flowing to the market at the same time through the few rural market channels. It was noted that Africare is currently working with the communities in Amuria to renovate a community store in Alito in Kuju sub-county and Amilimil in Obalanga sub-county to help farmers with storage while waiting for a suitable period to sell their produce. Such stores should be developed into warehouse receipting facilities.

- ***Poor state of the roads:*** The poor physical infrastructure especially the roads make it difficult for the farmers to transport their produce to the attractive markets in Soroti or other urban areas where they could command better prices. The status of the roads is manifested in high transport charges or irregular transport from the rural areas where most agricultural households are located. The poor roads and perishable nature of the produce like potatoes thus present a challenge that leaves the farmers vulnerable to exploitation due to difficulty in accessing the agricultural produce markets in the urban and peri-urban areas which pay better prices.

- ***Poor and limited transport facilities**:* Agricultural produce are is transported from the villages using bicycles to the respective markets. This common mode of transport limits the quantity of produce that could be transported to the markets and the distances that the farmers can move to sell their produce.

- ***Unscrupulous trade and produce theft****:* Farmers mentioned how some dealers/ traders defraud them by using faulty weighing scales when transacting business. In some cases, incidences were cited when the produce traders transfer losses incurred during previous trading period to the farmers who may have little choice but make good the losses since they don't have any alternative market channels. Farmers in Gweri and Serere particularly complained about these practices of faulty scales and transferring losses among traders. Farmers also cited the case of citrus buyers who sew together two bags to make a double bag and farmers are required to fill it and count is as one bag and are paid a price of one.

- ***Unfavorable negotiation tactics of buyers****:* The produce buyers often use unfavorable negotiating tactics because of the "monopoly" they enjoy in the market. Tactics normally employed included delaying the buying decisions until late in the day when farmers are faced with the possibility of going back with unsold produce. The buyers then take advantage of the farmers' predicament to offer very low prices which the farmers' may have no choice but to accept and avoid having to walk back long distances to their homes with the produce.
- ***Poor Approaches to marketing****:* the farmers largely market their produce as individuals, there was no evidence of organized marketing structures that can help the farmers master a strong negotiating position and influence the prices, this is partly because there exists no household surplus designated for the market, and what is marketed is based on adhoc decisions dictated by financial emergencies in the household. The produce is therefore marketed by the individual farmers as and when they pressed hard by other domestic requirements. The dealers thus exploit this situation to offer low prices for the agricultural produce, forcing the farmers to act as price takers in the absence of alternative source of income to address emergencies, the farmers eventually sell at the buyer dictated price.

- ***Low quality standards and post harvest handling procedures****:* The lack of adequate extension services on post harvest handling procedures has compromised the produce

quality thus lowering the prices commanded by the farmers on the markets. This has proved a constraint because of the low prices offered on account of the produce quality. A particular case of concern is the handling and processing of groundnuts, significant levels of aflatoxins have been detected in ground nuts from Teso. This was largely due to the poor drying methods used, the use of the shelling machines which require keeping the nuts moistened to avoid cracking and the high level of cracked nuts. These factors compromise quality of the nuts and the final price the market is ready to offer. Secondly drying on the ground results in high levels of soiling especially in the case of drying cassava, maize and millet. The buyers often factor in the cost of re-cleaning and sorting which further depresses the price to the farmers.

- ***Lack of adequate market information****:* The farmers often head to the community markets without having adequate market information specifically relating to the market prices. This lack of information often results in the farmers selling their produce at unfavorable prices because they are unable to decide and negotiate for the right price from an informed point. The major source of market information is by word of mouth and usually from persons returning from certain markets, this information is usually unreliable, out of date and may not be relevant for the next market day.

3.2.6 Critical Success Factors

The agricultural potential in the Teso region is enormous, however to fully exploit this potential the following were identified as the critical success factors which are need in order revamp the agricultural sector in the Teso region and increase marketability and market access for agricultural produce from the Teso region.

- ***Improvement in quality:*** While the natural quality of produce from Teso is considered high for the absence of chemical residues due to the non use of fertilizers, pesticides and herbicides and therefore should attract premium prices, there have been major quality issues arising from post harvest handling of the produce. Agricultural extension services will need to be intensified so that the farmers adopt good agricultural practices to maximise yields, maintain produce integrity through better post harvest handling technologies and sustain a reputation for quality in the market. While Teso agriculture

can be defined as organic by default, it is not officially recognised as organic and therefore can not access the speciality markets. However in the face of declining yields it may be necessary to access advantages of using and not using chemical pesticides, herbicides and fertilizers to boost production.

- ***Improvement in quality:*** It has already been noted that what households in the Teso region sell is not a surplus but what they would have wished to keep for household food needs, this partly explains the individual approach to marketing. Creating a marketable household surplus should be the first step to achieve organized marketing approaches for the farmers. One of the most favourable approaches to rural marketing is collective marketing where farmers bulk their produce in designated centres to create the bulk and then collectively negotiate with buyers or auction their produce. This will attract more profitable buyers and eliminate exploitative middlemen who trade on exploitation.
- ***Create infrastructure to support collective marketing;*** Collective marketing requires a specific kind of structural set up to be possible, firstly farmers must be organized in strong producer organizations (groups), secondly the farmers at the lower levels e.g. parish or sub-county must establish marketing committees to make the bulking processes and even facilitate negotiations with potential buyers or auctions, then there must be designated storage facilities where farmers collect their produce to create the bulk quantities so as to establish economies of scale and attract large buyers and finally promote a culture of documentation to maintain accurate records of all the produce received into the bulking centre/store. In analysing the marketing channel costs structure we established that the most preferred channel for the farmers had the highest costs structure with 60% of the marketing costs resulting from consolidation activities mainly carried out by freelance buyers or middlemen. If farmers can master the process of consolidation through collective action, this would create a huge saving which buyers would be more than happy to transfer to the farmers in form of improved farm gate prices. It is important to note that buyers often have fixed margins and manipulate the farm gate prices to preserve their margins. Reducing channel costs means buyers can offer better prices without compromising their expected returns or margins in a win-win situation

- ***Cost of production:*** Strategies to increase production economies of scale and lower the unit cost of production will be critical to increasing the profitability and attractiveness of the agricultural sector in the region. A typical farmer in Obalanga spends UGX 20,000 (US$10.2) to travel to Soroti town and procure 25kgs of ground nuts seed for planting at UGX 5,000 per kg would in effect spend UGX 5,800 per kg excluding other related travel expenses like refreshments. And if the seed was sold in the nearest trading centre or in Amuria town it costs about UGX6, 000. If the farmers organized themselves to form functional production groups, it could be possible to aggregate inputs needs to make a bulk purchase of required inputs and take advantage of wholesale prices and quantity discounts. In the case of groundnuts, if we have 200 households each growing one acre at a seed rate of 25kgs per acre, that would make 5 tons of groundnuts and this could cost UGX3,500 per kg delivered in Obalanga at the sellers cost. This can make a huge difference in the farmers production cost structure, turn them into an attractive market to deal with and increase their visibility and bargaining power in the market place.
- ***Group production orientation:*** The farmer should organize into viable production units as primary structures for productivity enhancement through exploiting the social capital available in the community to access better inputs and high paying produce markets. The argument and example illustrated above makes the case for collective action to confront market challenges.

  Increasing access to affordable inputs and improved seed varieties; The major factors determining access to improved seed and other farm inputs are affordability and availability. While breeding and improvement of seed is done at SAARI/NARO the seed has to be procured from seed houses in Kampala. Farmers complained of lack of improved seed varieties and even those that are available are unaffordable to the farmers, most therefore use seed from previous harvest. Setting up local seed multiplication fields as a commercial venture for some farmers can increase availability and lower the cost of accessing seed for the farmers in Teso.

3.2.7 Agricultural Enterprise Ranking by Profitability

Presented in the table 9 below is the enterprise ranking based on profitability. The detailed computations are in the appendices.

Table 9 Profitability ranking of key crop enterprises produced in Teso region

Enterprise	Gross Margin per Acre [15](UGX)	Rank (Based on Profitability)	% of households growing
Bambara Nuts	590,000	1	8.7
Citrus	562,000	2	51
Rice	536,000	3	28.6
Sesame (Simsim)	430,500	4	27
Onions	422,500	5	Negligible
Ground Nuts	336,000	6	76
Maize	318,000	7	66
Cassava	227,000	8	100
Tomatoes	203,000	9	Negligible
Green gram	127,000	10	52
Beans	99,000	11	36

The most profitable enterprises have the least number of households growing them, partly because these enterprises rank low in the household food needs list. It also highlights the challenge and imposed by food constrains to the households ability to engage in market driven agriculture.

Critical issues emerging from the study

- The Teso region has no recognisable commercial crop, farmers rely on food crops for both food and cash needs. Identifying a commercially viable enterprise and being able to promote it as an income source for households will have a two fold advantage, first it will release the pressure on the food crops which households divide between their household food needs and financial needs and has created a vicious circle of food insecurity in the Teso region

[15] This is the gross margin after first season. It's worthwhile pointing out that some equipment costs are incurred in the first season but not in the subsequent season. The gross margins thus improve in the subsequent seasons. These enterprises include like citrus, onions and tomatoes.

households. The most suitable commercial enterprise should not compete for the households limited production resources like labour and land with the food production in the household. Such a crop should be able to grow in the season when farmers are not growing food crops or can be intercropped with any of the major food crops. A commercial crop would ensure that the farmer households are both food and financially secure which will increase their resilience and ability to overcome poverty.

- The range of crops grown in the region has significantly dwindled; the count during our study was 20 types of crops as listed by the farmers with only about 12 of these being grown by at least 10% of the total households. This was rather a shocking finding for Teso that once boosted of a wide range of crops most of which have either disappeared or is on a tremendous decline. Examples of those declining tremendously include millet, simsim, green gram and Bambara nuts, while those that have almost or completely disappeared include cotton, sunflower, pearl millet and climbing yams.
- The use of the hand hoes is a major constraint to increasing production in the region, reviving the ox-plough technology through restocking especially oxen and increasing availability of ox-ploughs will address critical issues on land opening. SAIMCO the company manufacturing ox ploughs and parts in Soroti has equally collapsed due to low demand mainly because of decline in the use of ox-plough technology in Teso. Other alternatives for land opening include the use of the tractors or the hand tractor; however the cost implications of these methods in terms of sustainability may need a critical analysis. Preliminary observations from the study show that the cost of running and maintaining the tractor for the rural farmers at the current level of production and system of land tenure which promotes land fragmentation would make it less cost effective. The cultivatable is small and spread in different locations for each household which would involve significant movement from one field to another for the tractor and such movement has cost implication in terms of fuel usage efficiency. While hand tractors have not been experimented in the region, the soils are light loan or sandy soils which could be conducive for the hand tractor. This may need to be piloted and assessed as an alternative to animal traction.
- Horticultural crops especially tomatoes, onions and green pepper have a significantly high demand in Teso region and regions further north, however production of these crops in Teso may require significant investments on the side of the farmers to achieve commercial proportions. These have a high break even point and are highly perishable requiring an efficient marketing and transport infrastructure. The fragile nature of infrastructure and

agriculture in the Teso region may in the immediate future not be suitable to a community under recovery due to the high risks associated with poor infrastructure, production methods and low investment resources to engage in such delicate enterprises. It sounds however reasonable to promote these besides other enterprises and develop the capacity gradually to commercial proportions as farmers develop the required ability to cushion against loss from such high risk enterprises.

- The level of farmer organization is critical to master agricultural efficiency in the region, Africare will need to look at practical methods to building and developing farmer production groups that can be used to transition from food driven agriculture to market driven agriculture as a mean of widening their options for food security, increase the impact of development aid and programs and increase the production efficiency in the sector so as to make it more profitable, increase levels of employment by making the sector attractive and improve household incomes. The groups should be created based on sound production and business objectives, provided with relevant training in group dynamics and governance to address issues of coherence and develop into primary production units that can be affiliated to higher level farmer organizations like the district farmers association through which other services can be accessed. Examples of what well organized producer groups can achieve in the region can be seen from cases like the Teso tropical fruits growers association who have made an impact in the production of citrus and are making significant inroads into the marketing and value addition areas.
- The farm extension services are thin on the ground and not able to reach individual farmers, organizing farmers into viable groups will increase the effectiveness of the extension services providers who can be able to set up group based demonstration sites or field schools through which skills can be transferred directly through adoption or indirectly through diffusion across the groups. This would accelerate the rate of technology transfer, adoption of better farming practices and increase the reach and impact of the extension services provided.
- Teso region occupies a strategic position to access all the key agricultural markets for most of the produce, as noted from the study the key markets for Teso agricultural produce are the central market with the centre in Kampala, the eastern market which stretches over to the export markets of Kenya with Mbale and Busia as the main regional centres and the northern market which stretches up to Southern Sudan and Eastern DRC with Gulu and Arua as regional centres. Commercial farming in the region is highly viable once critical issues relating to production and market access are addressed.

- Food security issues are a major concern to households in the region, food security has four dimensions, The World Food Summit (November 1996) defined food security as state in which *"all people at all times have physical or economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*", FAO further asserts that "food security depends more on socio-economic conditions than on agro-climatic ones, and on access to food rather than the production or physical availability of food". In Teso region emphasis has been placed on production and physical availability of food alone as the main approach to food security. This approach alone lacks in flexibility and increases vulnerability to food insecurity. In the Teso region two dimensions should looked at critically; food availability and food accessibility. A lot has been going on in relation to food availability through self production, however efforts in promoting food security through market based interventions to increase food accessibility through trade and purchasing power as a way of making food more affordable still lags behind. Once these two dimensions can be addressed in a balanced manner, then the other two dimensions of food systems stability and food utilization can be achieved in order to create a food secure society.
- There is a void left by the collapse of the cooperative organization in relation to financing of agricultural activities. While SACCOS have been established at sub-county levels as one of the avenues to create rural savings and channel finances to rural enterprises, these have not lived to the initial expectations and they charge exorbitant interest rates, they are underfinanced and lack the desired savings base. A review of the SACCO in Toroma indicted savings of up to 3million shillings and a lending rate of 10% per month which translates to 120% per annum.

4.0 SYNOPSIS OF SELECTED ENTERPRISES

4.1 Ground nuts

Groundnuts *(arachis hypogaea)* is a leguminous plant which grows underground (geocarpy) to a length of 2 - 6 cm and has been grown in Teso as a traditional crop handed down from mother to daughter. In the Iteso tradition once a girl got married part of her send away package included seeds of groundnuts, Bambara nuts, millet and Sorghum for planting. The nuts have a thin, netted, wrinkly, fragile shell (pod) with 1 - 4 but generally 2 kernels, which are 1.5 - 2.5 cm in size. Peanuts grow best in loose, well-drained soils. Some species do better under irrigation but others manage quite well in fairly dry climates. Because yields can drop by 10% each time if the plants are cultivated on the same piece of land, peanuts in Teso are grown in rotation with other crops. It is grown in all parts of Teso and occupies an important place in the Teso household diets and food basket. It is also an important source of income for the households with a readily available market. Teso region produces 34% of the national groundnuts production. Peanuts are high in protein and contain 40-50% oil, 27% protein, 6.4% dietary fibre and a variety of vitamins and minerals. The foliate and the kernels are rich in antioxidants and are used in parts of Teso to make delicious vegetable dishes. Peanuts are eaten in all parts of Uganda, the whole peanuts can be eaten raw, boiled or roasted or made into peanut butter. The groundnuts are processed into peanut butter (paste) which is canned and sold; most of this is produced in the cottage industrial setting. The paste is used for cooking in urban households and as a substitute for margarine in bread. Rural households in Teso extract the oil and use it as a skin care cosmetic especially for babies. Generally 40% of the total groundnut production from agricultural households in Teso region is consumed within the household and 60% is sold to for incomes.

Table 10: Proportions of output retained for food security by HHs in Teso region.

Enterprise	Total production Output MT		Food Security Needs (Metric Tons)		Marketable Surpluses (Metric Tons)	
	National	Teso region	National	Teso region	National	Teso region
Groundnuts	177,000 (100%)	55,946 (38%)	47,794 (27%)	22,278 (40%)	129,210 (73%)	33,567 (62%)

The demand for groundnuts comes from strong domestic demand especially in the urban and industrial sector. The cottage industry is growing and current estimate show that it is accounting for 60% of the total market demand.

The market for peanuts is mainly national with all the current production being absorbed with the domestic market and an unspecified amount is important into Uganda from the eastern parts of the Democratic Republic of Congo.

One important factor impacting on the marketability of groundnuts from Teso region is the high level of aflatoxins which a number of studies have shown to be high. This phenomenon is appears to be resulting from the shelling and drying technologies currently employed which expose the groundnuts to high levels of abrasion and poor drying techniques. The cottage industry is the main source of secondary value addition with peanuts processed into peanut butter and canned, roasted and packaged in polythene bags or milled into flour and sold in the urban markets for preparation of local dishes in urban households and restaurants. The option for value addition for groundnuts in Uganda and Teso region specifically are limited, but opportunities lie more in developing the growing cottage industry.

There are three major channels through which groundnuts from Teso are sold, the community markets and the hawkers (buyers moving from home to home or to various village markets) are the most popular channels among the households. The major markets actors are the wwholesalers, urban retailers, consolidation agents and hawkers. These operate through four major market channels i.e. the domestic urban household market, the domestic cottage industry market, the rural household market and the regional export market especially to Kenya.

The Average yield per acre is 550kgs shelled weight under the current farming practices and fairly distributed rainfall as was the case in 2008 which was considered by farmers a successful year for groundnuts. The profitability analysis shows that farmers make a gross margin of 50.9% per acre cultivated.

Table 11: Estimate the gross margins for groundnuts

Item	Amount (UGX)
Gross Revenue	660,000
Total Variable Costs	224,000
Gross margin	**336,000**

Overall groundnuts is a commercial viable enterprise, yields can even be made better by using better farming practices such as good agronomic practices, use of fertilizers and good planting material. It is also an important food security crop that plays an important role in the daily household diet. **See for details in annex 1**

4.2 Bambara Nuts

Bambara groundnuts (*Vigna subterranea*) is a low-growing legume which originated in West Africa and first identified among the Bambara people of Mali, and very much like its famous relative the peanut in appearance. It is called Isuk in Ateso, Njugu mawe in Kiswahili, Kwaruru in Hausa language of Nigeria and Ntoyo in Zambia. Bambara groundnut is a low-cost, dependable farm resource that grows in harsh environments where many other crops fail. Resilient and reliable, it commonly yields food from sites too hot and too dry for peanuts, maize, or even sorghum and even in highly depleted soils. Production is primarily at subsistence level, and only the surplus is sold. Like groundnuts its cultivation has been passed down the generation from mother to daughter and for Teso, the crop offers various benefits, being an ideal subsistence crop, a good rotation crop, a good backstop for hungry times, and a promising commercial resource.

It is a nutritionally superior other legumes loaded with nutrients, 64% carbohydrate, 20-25% protein, 6.5% oil and a variety of other nutrients like vitamins and minerals. The nut is also a rich source of soluble fibre only found in oats which is known to prevent cancers. it is described as a food of exceptional nutritional quality, or a complete food and a little of it goes a long way toward maintaining good health. It is described as a complete food comparable to milk due to its complete protein profile, the bean has 4.8% lysine and 2.8% methionine both essential amino acid which make it a complete food and most suitable source of protein for Africa where quality proteins at a premium to the rural communities. FAO recons that, due to the relative resistance to diseases and pests, the bambara bean has the potential to improve food security in many rural areas as well as become a stable, low-cost and profitable food crop for Africa's small-scale farmers. People can depend on Bambara nuts alone because it is has loaded with adequate quantities of all the vital nutrients. Bambara groundnuts is essentially grown for human consumption, the gross energy value of the groundnut is greater than that of other pulses like cowpeas, pigeon peas, and lentils (FAO, 1982). The Bambara nut is consumed in the household, boiled fresh or dried and sold for income. The bean is also used in a number of traditional ceremonies and rituals for sacred purposes. The seeds grow readily in all types of soils and have been described as the poor man's crop. The crop has a number of production advantages in that it can yield on poor soils with little rainfall as well as produce substantial yields under better conditions. Until 25 years ago Bambara nuts were a major rotation crop in Teso grown in the second season; however its production has significantly declined.

Table 12: Levels of production

Year	Africa	Teso region	Imports
Production (Tonnes)	330,000 MT	2,576*	2,400*

Source: Lost crops of Africa Vegetables (2006), *Calculated estimates for 2008.

The total production in Teso is estimated at 2,576MT while Africa as a whole produces 330,000MT with nearly half of this is produced in West Africa and the other half in East and Southern Africa. The seeds are valued both for their nutritional and economic importance and command a high market price, with demand far outweighing supply in many areas (Coudert, 1982). The uses of Bambara groundnuts are largely for domestic consumptions, meaning it does not presently feature in several markets, the most dominant market for the nuts from the Teso region is the local urban markets in Soroti town and Mbale. Outside Teso region Bambara nuts could only be found in Mbale market and Nakasero market an upscale market in Kampala. Most of the supplies sold through Mbale are consumed in the urban households while the bulk of it is exported to Kenya via Malaba and Busia. Most of the Bambara nuts sold in Nakasero market is imported from Tanzania with annually imports by traders in Nakasero Market estimated at 8tons.

Table 13: Marketed volumes of Bambara Nuts

Year 2008 Production	Household	Teso (Local Market)	Regional market (Mbale)	Total Market Volume
2,576 MT	257.6kg	1,030.4kg	1,228kg	2,400kg

Source; JP Marketing research data 2009

Bambara nuts are traded through two major channels which is the community markets which buys mainly the fresh boiled beans for a snack, and the direct market channel where the dried beans are sold to dealers based in Soroti and Mbale through to the export markets especially Kenya and the third channel. The Average yield per acre is 400kgs shelled weight per acre and the profitability analysis shows that farmers make a gross margin of 59% per acre cultivated.

Table 14: Estimate the gross margins for each enterprise

Item	Amount (UGX)
Gross Revenue	1,000,000
Total Variable Costs	410,000
Gross margin	**590,000**

Bambara nuts are one of the endangered local crops of great food security value and high commercial potential. Its high nutrient levels and especially quality protein comparable only to animal protein makes it ideal for feeding programs and a excellent substitute for the expensive animal protein. Most importantly in a region like Teso which is so prone to drought Bambara nuts are an excellent opportunity to counter the effects of climate change, increase opportunity for income generation and raise rural incomes. **(See Annex II for details)**

4.3 Simsim (Sesame)

Sesame (*Sesamum indicum* L.) is one of the oldest cultivated plants in Teso and the world as a whole. It was a highly prized oil crop of Babylon and Assyria at least 4,000 years ago. Today, India and China are the world's largest producers of sesame, followed by Burma, Sudan, Mexico, Nigeria, Venezuela, Turkey, Uganda and Ethiopia with most of Uganda's' production coming from Northern Uganda.

In Africa Sudan is the largest producer of sesame followed by Uganda and Nigeria Sesame, commonly known in Uganda as "simsim" it is well adapted to Uganda's warm climate and requires moderate to low rainfall. In Teso and northern parts of Uganda it was grown by women as a tradition but has now taken a commercial dimension as a major income earner for households in Lira and West Nile, however commercialization of sesame still lags behind in the Teso region although the commercial varieties (Sesame I & Sesame II) grown in Lira and West Nile were bred and developed in Serere zonal agricultural research & development Institute. Commercial uses for sesame in Uganda are expanding and include use in oil extraction, confectionery and animal feeds, Uganda sesame is particularly popular in the international markets for its high oil content and large white seed which has a strong aesthetic appeal especially when used on confectionary products. The export demand currently exceeds world supply by over 50% and has a sustainable export market for the next foreseeable future with India and China the two major producers and exporters becoming net importers since 2007.

The main export markets for the Uganda's sesame are Japan and Europe; other leading importers of sesame in the world are India, China and the USA. Sesame seeds are demanded by a variety of markets in various forms like raw seeds crushed, de-hulled seeds, unrefined oil and refined oil. The sesame export market in 2007 was estimated at over $1billion US dollars, this is bound to grow further since China and India the world's leading producers and exporters have turned into net importers, with India being the latest to join the import market. Asia exports 17% of its food grade sesame production but imports twice as much of the oil grade sesame (34%) from Africa especially Uganda and Sudan with Nigeria being the main exporter to the US market.

Africa accounts for 28% of the over $1billion export market with Sudan, Uganda and Nigeria being the main exporters. Unfortunately sesame from the Teso region has limited access to the export market with most of it traded in the rural and urban retail markets because of the lack of commercial orientation. Commercial estimates show that if Uganda could cultivate 750,000 acres of sesame annually at the current productivity rates, then Uganda would control 20% of the world exports and earn Uganda foreign exchange to the tune of US$249,375,000 annually. In real terms this should earn 300,000 Ugandan households US$400 per annum at the current world market price of US$950 per ton after deducting dealer and exporter margins.

Table 15: Estimated the gross margins for each enterprise

Item	Amount (UGX)
Gross Revenue	600,000
Total Variable Costs	169,500
Gross margin	**430,500**

Sesame is an important crop in the Teso which plays a dual role of food security and income generation. Uganda has a comparative advantage in the production and marketing of sesame and could easily become the leader after Sudan in the export of Sesame in the world which could earn bring significant foreign earnings to the country If as a country we raise our production to 375,000 MT which translates to 750,000 acres at the current level of productivity. Teso region and the Northern parts of Uganda particularly are better positioned to take advantage of this opportunity. **(See annex III for details)**

4.4 Green Gram

The green gram (*Vigna radiate* also known as *Phaseolus radiatus)* is one of the most wholesome among pulses. It is free from the heaviness and tendency to produce gases in the tummy *(flatulence)*, which is associated with other pulses. It is an erect bushy annual widely cultivated in Teso for generations and grows in warm climatic regions. It is a native of India which was introduced into East and Central Africa from India. In Teso it is consumed in the form of whole dried seeds prepared whole or mashed into a think delicious sauce eaten with potatoes or millet bread.

Green grams grow best at an altitude of 0-1600 m above sea level and under warm climatic conditions (28 to 30°C). They are well adapted to red sandy loam soils, but also do reasonably well on not too exhausted sandy soils. Green grams are not tolerant of wet, poorly drained soils. They are drought tolerant and will give reasonable yields with as little as 650 mm of yearly rainfall. Heavy rainfall results in increased vegetative growth with reduced pod setting and development. It fits well in various multiple and intercropping systems. After picking of pods, green gram plants may be used as green fodder or can be incorporated as green manure. It is grown as a second season crop or inter-cropped with millet and other cereal crops. The crop matures in 80-90 days; improved varieties are currently grown in Kenya which matures in 60-65 days. Teso region currently produces 6,230MT annually; typical yields per acre in are 80-120kg, in neighbouring Kenya and in India typical yields range from 120-180kg per acre. Teso region accounts for 50% of the total production in Uganda and of this less than 10% is retained for household consumption.

The green gram produced in Uganda is all consumed within the country; an unspecified quantity is also imported into the country especially from India and China. The imported green gram products mainly dhal is sold through supermarkets. Dhal is popular with the Asian and Chinese community in Uganda as well as the upscale hotel market in Uganda. Market studies show that only about 40% of the current demand is met by both local production and imports. It is becoming increasing difficult to find enough green gram for preparation of local snack "Samosas" which has resulted in the increasing use of meat, cowpeas and other leafy vegetables as an alternatives for preparation of vegetable "somosas". Current production from teso is sold in Mbale, Kampala and Busia markets. Limited exports from Teso and parts of Northern Uganda go to Juba in Southern Sudan where green gram is on high demand. The opening up of the Southern Sudan export market is expected to further increase the gap between demand and supply in Uganda. Other major international markets for green gram are the EU which imports about 120,000MT annually mainly for human consumption. It is considered a source of high quality animal feeds in Europe however its use in the feed industry is still limited due to inability to find sufficient quantities for feed preparation. Priority is being given to human food consumption. Besides the cottage industrial use for preparation of bakery products like "samosa", there is a huge opportunity to increase production and add value to produce "dhal" which has high demand among the elite markets and the large Asian, Somali and Chinese community in Uganda. Dhal is also popular in the Southern Sudan which provides opportunity for regional export. Value addition is ideal for cottage processing with the right choice and use of appropriate technology.

Farmer rely on three major marketing channels for green gram, these channels are the community markets which account for 80% of the total household sales, the village hawkers and direct delivery to the urban dealers which account for 10% each. The urban dealers especially located in Soroti town play a major role in consolidating the produce and are the major channel for the produce to the regional and national urban markets.

Table 16: Estimate the gross margins for each enterprise

Item	**Amount (UGX)**
Gross Revenue	300,000
Total Variable Costs	173,000
Gross margin	**127,000**

There is a great potential for developing green gram as an important commercial crop for the region, there is also potential to increase productivity by introducing quick maturing varieties and improving

agronomic practices as part of the commercialization process. Increasing farm productivity to about 150kg/acre can increase the gross margin for the farmers by **UGX140, 000** which is a **110%** increase in gross margin. **(Details see annex IV)**

4.5 Cassava

Cassava (Manihot esculenta) is a perennial woody shrub with an edible root that grows in tropical and sub-tropical areas of the world. Cassava has gained popularity largely because of its ability to tolerate drought and can grow in low-nutrient soils where cereals and other crops do not grow well. It has also been promoted as a key food security crop since the cassava roots can be stored in the ground for up to 24 months, with some bitter varieties lasting up to 36 months. Cassava harvest may thus be delayed until market, processing, or other conditions are favourable. To highlight its emerging role as a food security crop, the low income food deficit countries produced 142 million tonnes representing 66% of the estimated global production. This cassava production trend has continued to increase in these countries.

In Africa, cassava is mostly grown on small farms, usually intercropped with vegetables, plantation crops (such as coconut, oil palm, and coffee), yam, sweet potato, melon, maize, rice, groundnut, or other legumes. The application of fertilizer remains limited among small-scale farmers due to the high cost and lack of availability. Roots can be harvested between 6 months and 3 years after planting. As a root crop, cassava requires considerable labour to harvest. Because they are highly perishable, roots must be processed into a storable form soon after harvest. The main cassava producing countries in the region are D. R. Congo (21m MT) followed by Uganda (4.0m MT) and Madagascar (2.5m MT). Smaller producers are Kenya (0.86m MT), Burundi (0.6m MT) and Rwanda (0.4m MT) although, in recent years, production in all three latter countries has begun to increase, associated with greater national attention to the crop, but mainly as a result of increased area under cultivation. The increase in production in Teso region particularly and across the country is due to an increasing response to food security (63%), market availability (12%) and population growth (10%) while 15% of the cases attribute the increase to improved yields. Cultivation is generally thought to require less labour per unit of output than most other major staples. Though cassava is able to grow and give reasonable yields in low fertility soils, adequate fertilisation is needed for the crop to reach its maximum production potential. Cassava requires relatively little nitrogen; however, phosphorus and potassium are important nutrients needed to maintain high yields in a continuously cultivated area. Potassium fertilisation is essential because deficiency leads to lower dry matter and starch content, and consequently a higher cyanogenic potential in the storage roots. Cassava, the main

food security crop, grown by all the agricultural households in the Teso sub region and it provides the basic daily source of dietary energy. The flour in the households alone or mixed with sorghum or miller flour and used to prepare a starchy meal eaten with a sauce at meal time. It is also eaten boiled or roasted fresh and eaten for breakfast or as a snack. In Africa and Latin America, cassava is grown largely for human consumption, while in Asia and parts of Latin America it is also used commercially for the production of animal feed and starch-based products. In Uganda, Cassava is the second major food crop after plantains (bananas) with sweet potatoes coming in third. Whereas Cassava has not attained wide spread industrial use in Uganda compared to the domestic use, however the local cottage industry engaged in brewing and distilling consumes a large proportion of the dried cassava which is used for the production of a local potent gin.

The durability of cassava tubers in the ground for relatively long periods, has given it an important commercial role among the Teso households besides food security. The farmers can harvest the tubers as and when there is need for money to help meet other household needs. Compared to other foods, cassava flour and the tubers are relatively cheap. This has also contributed to its popularity amongst most low income households in the urban areas where its widely consumed thus assuring increasing demand with the growing population.

Cassava, the second major food security crop after plantains, is mainly consumed in domestically by households in the country as cassava flour. It's the major source of daily dietary energy.

The total national cassava production has been increasing over the years reaching an estimated 4.9 million tonnes in 2008. Cassava production declined in 2005-2006 largely because of cassava mosaic. However, this has been addressed by the introduction of new varieties that are resistant to cassava mosaic, thus the increase in production. The table below shows the national production figures for cassava.

Table 17: National production (trends) Figures

Year	2004	2005	2006	2007	2008
Production (000's Tonnes)	5,500	5,576	4,926	4,456	4,942

Source: FAO data 2009

The cassava from Teso sub region goes to the markets in eastern region towns of Mbale, Malaba, Busia and Kampala as the main market in the central region. The demand for food in the central region is exacerbated by the fact that it accounts for the lowest overall national food production because of a low agricultural household proportion of 61% of the total households in the region. It has a largely urban population. Besides the domestic market, cassava from the Teso sub region is also exported to Juba in South Sudan.

Table 18: Estimate the gross margins for each enterprise

Item	Amount (UGX)
Gross Revenue	472,500
Total Variable Costs	245,000
Gross margin	**227,500**

In general cassava is a key food security crop in the Teso sub region and has surpassed finger millet which previously was widely grown for food needs. Commercially cassava is inferior compared to most other crops. However it marketability derives from the large low income urban and peri-urban population as well as its role in local brewing industry which continues to provide a ready market for cassava. **(Details see Annex V)**

4.6 Maize

Maize (Zea mays) is the third most important cereal grain in the world after wheat and rice, providing nutrients for humans and animals and serving as a basic raw material for the production of starch, oil and protein, alcoholic beverages, food sweeteners and, more recently, fuel. The green plant, made into silage, has been used with much success in the dairy and beef industries. After harvest of the grain, the dried leaves and upper part, including the flowers, are still used today to provide relatively good forage for ruminant animals owned by many smallholder farmers in developing countries.

In Uganda, maize is an important crop that is virtually grown across the whole country. Presently it is the most important cereal crop with an estimated annual production of 1.2 million tonnes making it the fifth mostly grown crop in Uganda. The crop occupies a strategic position in the country's food security alongside bananas, cassava and sweet potatoes. Maize also provides farmer households, farm produce buyers, processors, exporters and transporters with income. It is therefore an important crop from both national food security and income-generation. Maize requires about 500-750 mm of well-distributed rain for proper growth and is generally resistant to drought. The demand for moisture is low after germination and increases during the tussling or reproductive period, moisture requirements again reduce towards maturity. In Uganda, maize is mainly grown for domestic consumption. Maize is eaten in many areas of the country green or roasted on the cob or as a maize meal made from the flour called "posho''. The bran is used in the preparation of poultry and other animal feeds. Maize is not a major commercial crop in Teso with most of grown as an

intercrop with other legumes or at the backyard of the house or abandoned kraals for leisure snacking.

Most of the maize from Teso is consumed within the Teso markets and over 80% of the total consumption comes from the neighbouring districts of Bugisu region. It has a strong institutional market like schools, universities, government penitentiaries and the World Food Programme (WFP) which then supplier's relief and humanitarian support to displaced areas.

Table 19: Estimate the gross margins for each enterprise

Item	Amount (UGX)
Gross Revenue	500,000
Total Variable Costs	182,000
Gross margin	**318,000**

Overall maize is a key staple food in the Uganda. Given that it's widely consumed across the country and thus presents a good market for the agricultural households engaged in maize growing. The gross margin from the crop presents an incentive to grow it although rice may provide a better gross margin per acre. **(Details see annex VI)**

4.7 Rice

Rice (*Oryaza sativa)* is a cereal that is grown in the swamps and wetlands in Teso, and is considered to be a staple food for over half of the world's population. It is a semi-aquatic plant, meaning that it can grow partly on land, and partly submerged in water. Rice plants grow to become green, grassy plants about 60-100 cm tall. Each plant contains many heads full of tiny rice grains that turn golden when the rice plant is ready for harvest. Rice production in Uganda started in 1942 mainly to feed the World War II soldiers, however due to a number of constraints, production remained minimal until 1974 when farmers appealed to the then government for assistance. In response, government identified the Doho swamps and constructed the Doho Rice Irrigation Scheme.

Today rice is grown mainly by small scale farmers almost through out the country, but also with large scale farmers in few places. It is mainly consumed as a staple food by the urban households in Uganda and consumption has been increasing over the years. It's now the third highest imported food item in Uganda by monetary value (US$90million) in 2008. Most of the rice produced in Teso is sold for its high value to earn income. The commercial role is highlighted in the findings of the UNHS 2005-06 which indicated 90% of the rice grown is sold on the market with the agricultural households retaining only 10% for domestic consumption. It significance in the urban household

diets is growing with increasing urban and peri-urban populations and all the rice produced in the country is consumed by the domestic market. Local production is also supplemented by rice imports into the country which account for 60% of the total domestic stock. The total rice consumption is estimated at 420,000 metric tones while the total national production is estimated at 168,000 metric tones leaving a deficit of 252,000 metric tonnes. This deficit is met by the rice imports into the country. Demand is driven by the increasing urbanisation rate coupled with the population growth rate of 3.2%; the demand for rice especially by the urban population will continue increasing. Government under the import substitution strategy has aggressively promoted the production of rice and has facilitated research and release of new varieties like NERICA 1, 4 and 10 to increase rice production in addition to the old lowland varieties. Since the introduction of upland rice in 2002, rice farming has grown from 4,000 farmers to over 35,000.

To farmers in Teso opportunities exist under the import substitution programs of government and the growing local gap between demand and supply to commercial farming. However careful assessments must be carried to study the viability of upland rice as opposed to paddy rice due to its significant environment effects. Most of the current production in Teso occurs in the protected wetlands around the Lake Kyoga and Bisina in Soroti and Kumi districts which by law is illegal.

Table 20: Estimate the gross margins for each enterprise

Item	Amount (UGX)
Gross Revenue	1,008,000
Total Variable Costs	472,000
Gross margin	**536,000**

The high gross margin per acre of rice and increasing demand in the urban areas make rice a good enterprise especially for household income generation purposes. A gap in supply due to the high domestic demand is presently being met by rice imports. Considering that there is increasing urbanisation and the relatively high population growth rates, it's unlikely that the domestic supply will outstrip demand. The adoption of upland rice which has the capacity to grow outside swampy areas will help mitigate the environmental effects and pressure on the wetlands where rice is presently grown. **(Details see annex VII)**

4.8 Citrus (Oranges)

Oranges *(citrus sinensis)* is a the most commonly grown tree fruit tree in Teso and the world, believed to be native to the subtropical and tropical regions of Asia and the Malay Archipelago, oranges are grown everywhere in Uganda mainly at the backyard of the household or as

ornamentals trees and the fruits eaten as a family leisure. There has not been much emphasis on the commercial potential of oranges until in the present decade when it has been promoted as a commercial fruit tree mainly by the NAADS program in Teso region and other parts of Eastern Uganda especially Tororo and Busoga region. It is a subtropical plant requiring a temperature range from 12.78º-37.78º C. Favourable annual precipitation varies from 125-500mm, though oranges are frequently grown in areas receiving 1000-1500mm of rain. In damp climates the fruits lack juice and are usually very sour. Oranges grow best in well-drained soils, with adequate depth for good root development. The most popular way of propagating the oranges is by budding the root stocks since these yield much earlier than those propagated from seedlings. Teso region is currently one of the leading commercial producers of citrus in the country; other major producers include West Budama in eastern Uganda and Busoga region. Uganda's production by 1999 was estimated at 26,000MT but with intervention of NAADS it is believed to have tripled. There are currently 300 registered commercial citrus farmers under the Teso tropical Fruit growers association and together had 1million trees by 2008. The membership has most farmers who produce Valencia, Washington Naval, Hamlin and local varieties with about 300 to 500 trees per household. Sources of planting materials are the National Semi Arid Research Institute, individual farmers under NAADS, community nurseries and NGOs have continued to grow and the projected number of trees in the next five years is 10million. Oranges are primarily eaten fresh, out-of-hand, and especially consumed in warm climates or sold for income and it has become a major source of income for some households in the Teso region, they are also used for industrial extraction of juice and orange juice is increasingly gaining acceptance in the local market and industries like Britania and Jakana now process oranges to produce packaged orange juice.

The major market players in the citrus sub-sector in the Teso region are the fruit processing company's. Britania Ltd, Jacana Enterprises in Kampala and Elgonia Ltd in Mbale. However most of these do not have a direct market presence in the Teso market but use agents who buy and deliver to their factories.

Table 21: Firms that process fruits into juice

COMPANY	LOCATION	PRODUCTS
Reco Industries Kasese	Kasese	Passion fruit juice concentrate and jam
Britannia Ltd.	Kampala	Mango juice and passion fruit juice, Orange juice
Elgonia Ltd.	Mbale	Pineapple and passion fruit juice concentrates
Jacana Enterprises	Kampala	Pineapple and passion fruit juices, Orange juice.
Craft Bazaar Ltd	Kampala	Pineapple and passion fruit juices.

Besides use in the industry, most of Uganda's oranges are consumed in the local markets and households where it is eaten fresh or used to extract juice for personal consumptions or sold in restaurants, or travellers at the road side. The upper end of the market tends to prefer imported oranges mainly from South Africa which are imported and sold in the supermarkets and cities like Kampala and Entebbe. Alternative markets for Teso oranges are Southern Sudan, DRC, Rwanda and Burundi; however current production levels and marketing structures are a major constraint to accessing these markets. There are also efforts with support for government to attract an investor to set up a Juice factory in the Teso region to process Oranges, this if done should be able to boost the local market for the citrus in the region.

Table 22: Commercial Orange Production in Teso region

Year	**2003**	**2007**	**2008**	**2013-projected**
No. of registered farmer	25	120	250	3,000
No. of fruiting Trees	200,000	480,000	1,000,000	10,000,000
Total production (MT)	60,000	144,000	300,000	3,000,000

Table 23: Estimate the gross margins for each enterprise

Item	**Amount (UGX) 1st harvest**	**Amount (UGX) subsequent harvest**
Gross Revenue	2,000,000	2,000,000
Total Variable Costs	1,438,000	426,000
Gross margin	**562,000**	**1,574,000**

The citrus sub-sector is a very infant and underdeveloped sector in Uganda and Teso region. There is however greater potential for the sector especially if value addition opportunities can be exploited. The growing consumption of citrus products in the developing countries and Uganda in particular offers greater opportunities for the sector as one of the sectors worthy investing in for the future. **(Details see Annex VIII)**

4.9 Onions

Onion *(Allium Cepa)* is a cool season plant which grows well in a wide range of temperatures. Onions may be established by planting seed or transplanting sets (young onion plants). Onion seed will germinate well at soil temperatures from 7.5 **°C** to 27.5 **°C**. Onion plants will express their best growth at temperatures from 13.5**°C** to 24 **°C**. High quality onions require cool temperatures during early development and warmer temperatures during maturity. Onion plants have shallow roots and

relatively few, slender leaves, which make onions poor weed competitors. Dry onions, are mature onions with a juicy flesh bulb covered with dry, papery skin and grow in alluvial or sandy loan soils. Phosphorus and potassium fertilizers should be available throughout the growing season for best yields. Caution should be taken about excessive nitrogen, because it delays bulb formation. Onions perform very well in cool areas with fairly high rainfalls, especially for seedlings. A fairly long dry period is however necessary for ripening of the bulbs. Teso region is relatively hot with temperatures averaging 28 °C with average low temperatures of 23**°**C which makes the region unsuitable for onion production. In Uganda, two varieties of onions are popular; Bombay red with sweet odor and red creole with a pungent order. The red creole is the variety that is promoted for commercial purposes. Onions, one of the oldest vegetables, are found in a large number of household recipes and preparations where it is used for seasoning salads, boiled with other vegetables, and meat products as spices. They are an essential ingredient in many sauces and relishes. Onions are among the most sought after vegetables in our local markets, as they are a key ingredient for many dishes. The major markets are the urban market and peri-urban markets. Teso region does not produce sufficient onions and therefore receives most of its supplies from the neigbouring districts of Sironko, Mbale and Kapchorwa which are the major producers of onion in Eastern Uganda. Primary data from the field studies indicated that just like tomatoes, the Teso sub region produces commercially insignificant quantities of onions, because of the unfavorable high temperatures and depend largely on supplies from the highlands of Bugisu and Kapchorwa. The team did not find relevant local data to estimated the possible production cost and profit structure of the enterprise in the Teso region because farmers have no experience in growing it, however agronomic analysis indicates that commercial production of Onions is not a viable venture in Teso region, the average temperatures do not favor onions growing and would result in poor overall yields. Inspite of its enormous demand, the fact that yields per acre are likely to be very low in Teso region compared to Bugisu region and Kapchorwa means Teso onions would be highly priced if farmers were to make any profits which would make them less competitive. Comparatively Teso would not enjoy any advantage over their neighbors in Onion production which makes it a less viable venture. Production can therefore be limited to the kitchen garden for household consumption. **(Details see Annex IX)**

4.10 Tomatoes

Tomato *(Lycopersicon esculentum)* has become a major world food crop in less than a century. Native to the Andes, domesticated in Mexico and until recently thought by many to be poisonous, tomatoes are now consumed everywhere. The popularity of the tomato comes not only from its

flavor and freshness, but also because they are easy to conserve through processing, for example as ketchup, sun dried, tinned, powdered, pureed or juiced. Such versatility coupled with a growing demand for the fresh fruits, has pushed the development of tomato as a one of the main crops of the century.

In most developing countries, tomato is a seasonal crop integrated into complex local farming systems. It is highly valued for the variety of ways it can be eaten, cooked, conserved, and selected for its suitability to end uses. Its varied micro-nutrient content also plays an important nutritional role.

In Uganda, tomatoes are the number one high-value food crop, grown for both local and regional consumption[16]. It is an occupation that a household may comfortably depend on for income even with just a small piece of land. There aren't that many overhead costs to worry about, apart from the cost of seeds and some agrochemicals and transportation of the crop to the market. They grow on many soil types but all good tomato soils must drain well. On sandy soils, tomatoes mature early, but silt or clay loam soils are generally considered the most productive. Tomatoes are considered 'heavy feeders' because of their rapid growth and long production season. Optimal soil pH is 6.0 to 6.5 and warm temperatures of between 21-27°C, high temperatures result in small fruits and early ripening. Tomato growing in Teso is a new thing and the farmers would require significant training and extension services to achieve the farm efficiency levels currently enjoyed by farmers in the neighboring regions of Bugisu and Kapchorwa. Besides temperature in Teso are generally high which while good for the growth of the tomato seedling results in small poor quality and early maturity fruits that cannot be competitive in the market. Perhaps there is no vegetable commonly used in cooking as the tomato, its usage or none usage often makes a big difference in the taste of the food, therefore most people use it to make their cooking tastier. It is sometimes served raw in various salad preparations and industrially canned products like tomato ketchup, dried tomato and tomato juice. While no reasonable and reliable statistics about demand and consumption of tomatoes could be found, there is sufficient anecdotal market evidence to show that demand for tomatoes far exceeds supply all year round which causes tomato prices to fluctuate around the year with prices highest between December and March. Tomato farmers are some of the most highly motivated farmers with good returns for their investment all year round. Teso region is a major consumer of tomatoes

[16] Integrated Pest Management Collaborative Research Support Program (IPM CRSP), www.oired.vt.edu

most of which comes from the neighboring Bugisu region. Primary data from the field indicates that the Teso sub region hardly grows any tomatoes, because of the unfavorable weather conditions and rudimentary farming practices.

Tomatoes are highly perishable and the poor transport infrastructure in Teso would be a major commercial constraint to the movement and marketing of such perishable products like tomatoes. While there are opportunities for export to the neigbouring countries in the region, the poor infrastructure is equal impacts on Uganda ability to produce for export.

Table 24: Estimate the gross margins for each enterprise

Item	Amount (UGX)	Subsequent year Amount (UGX)
Gross Revenue	1,440,000	1,440,000
Total Variable Costs	1,237,000	367,000
Gross margin per acre	**203,000**	**1,073,000**

Note: The gross margin improves to UGX 1,073,000 per acre in the subsequent seasons since the irrigation equipment cost is a one of cost item.

Tomato is a highly profitable enterprise for the rural farmers, while the initial investment is high due to the capital investment on the irrigation system; the overall production costs are low. However the high temperatures in Teso region would demand investment in irrigation systems, something that would severely be constrained by the limited water bodies in Teso region. Secondly tomatoes while consumed for many decades are a new crop in Teso and there is no knowledge about its agronomy, pest and diseases and control measures and even understanding of the growth cycles. To develop the sub-sector would require 5-10 years of sustained farm extension support services to commercialize the crop and bring the growing households to a state of profitability.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 Production Aspects

- Teso sub region is a main producer of cassava, maize, sweet potatoes, sorghum, ground nuts, beans and millet. It is the leading producer of cassava, green gram and citrus fruits (oranges). The citrus fruits, rice, ground nuts and Bambara nuts are the main crops grown for commercial purposes in the sub region. The sub region makes considerable contributions to the national production, highlighting their capacity to produce commercial quantities of these crops. This capacity can be developed by focusing efforts further to exploit market opportunities along specific enterprise lines in order to boost the household incomes.
- The sub region however retains most the staple foods for food security purposes, leaving very little quantities for income generation (fig.2). This shows that production is mainly geared towards household consumption.

  The table 9 below gives a summary of the rankings

Table 25 Summary of the production and food security rankings

Crop	(Production) Ranking	(Food Security) Ranking
Cassava	1	1
Sorghum	4	2
Sweet Potatoes	3	3
Peas	9	4
Millet	7	5
Beans	6	6
Ground nuts	5	7
Maize	2	8
Simsim	10	9
Green Gram	11	10
Soya Beans	13	11
Rice	8	12
Bambara nuts	12	13

- Production technologies employed are rudimentary (mainly the hand hoe) which has greatly reduced cultivatable land and quantities produced. The Teso farming system was built around the Ox-plough technology but which was set back by the Karimojong cattle rustling and rebel incursions from the north, which depleted the stock of oxen and other livestock.

- Generally, there is hardly any value addition of commercial proportion done to the produce at the farm gate level, except drying, partial cleaning and grinding into flour, for the staple crops such as cassava, sorghum, potatoes and millet or into paste for the oil seeds like groundnuts and simsim.

5.1.2 Market and Marketing Aspects

- Teso region is a leading producer of crops like cassava and sweet potatoes and also enjoys a comparative advantage in the production of many crops like green gram, Bambara nuts, groundnuts and cow peas compared to many regions that supply the same agricultural produce markets (Table 4) shows the national production contribution of these enterprises by the Teso region.
- Farmer groups are being formed to receive aid rather than focus on addressing production related issues. Very few groups are now being formed with a marketing orientation and this is particularly better in the citrus fruit segment where the Teso tropical fruit farmers association has demonstrated the potential of group orientation. There appears to have been no collective efforts and initiatives to address common marketing challenges encountered by the farmers through the use of social capital to create the required numbers and the necessary capabilities for adaptation and self renewal. There is however some evidence on the ground that Africare is organizing and training farmers groups around the production of horticultural enterprises, this effort should extended to the level of marketing and resource mobilization.
- There are weak farmer groups that are heavily reliant on development NGOS and government programmes like NAADS for their existence. This has problems with long term sustainability of any initiatives started with the communities, one of the most important competencies needed by communities to be able to adapt and self renew is

internal coherence. Most of this was lost through years of insurgency and yet it is quality which is vital for collective bargaining and lobbying for social services needed to promote agricultural production and marketing.

- There are three major market outlets for farmers in Teso; these are the rural markets which account for 10% of the produce sales, the mobile (Hawkers) buyers accounting for 20% and the agent markets (established produce dealers and agents operating in the gazetted markets) like Otuboi, Ocapa and Ocorimongin accounting for 70%. The farmers have shown preference for these market channels, of the three channels the gazetted markets where dealer agents come offers the better prices but is less accessible to the ordinary farmers because it occurs once a week or a fortnight. The Hawker market is most available to the farmers but also offers the least price, however these markets act as feeder markets to the agent market. The agent markets is the dominant market channels and the main actors the agents of major produce dealers in Soroti, Mbale and Kampala are the main buyers, however they are more interested in pursuing their own interests of maximising their profit margins, but have no interest in long term sustainability and development of the market . They derive their advantage from their ability to transact on a cash basis, a reason the farmers have shown preference for them.
- Few viable market options. Farmers in the rural areas can only market their produce to the few hawkers and dealers largely because there are no opportunities available for them to engage with the major principles of the agents. Collective marketing approaches are more likely to create an incentive to engage directly with the principle buyers and form sustainable market partnerships that will guarantee access to fair markets and have a long-term sustainable business model.
- Generally most of the financial institutions in Soroti and in the country do not lend to farmers, only Centenary rural development bank has presently develop agricultural tailored financial products tailored towards financing farming as a business. There is still limited access to agricultural finance and the situation is worse in Teso compared to Kapchorwa, Masindi and central parts of the country. Most of the financial institutions are shying away from lending to farmers because they are perceived as high risk borrowers, however where farmers have reached high levels of organization like the

maize farmers in Kapchorwa and Masindi and the sunflower farmers in Lira and Southern parts of Uganda like Fort portal, banks have found it viable to lend to farmers with Centenary rural development bank leading the pack. Through collective action and group guarantee schemes it is possible to attract and increase access to financial products from the financial institutions

- Access to information and other BDS services is important for commercial farming and building profitable market linkages. Rural market information systems are a vital tool for collective marketing & bargaining, production planning and cost management. There is a huge information gap among the Teso farmers which has left them prone to exploitation, lack of information means the farmers can not make informed decisions, and can not challenge the unfair practices of the exploitative market actors such as the buyer agents who even when asked to procure at a higher price by their principles come and offer lower prices in order to make an unofficial cut for themselves.

Table 26 below summarises the profitability ranking for selected enterprises

Table 26: Profitability ranking of key crop enterprises produced in Teso region

Enterprise	Gross Margin per Acre [17](UGX)	% Gross margin	% Return on investment	Rank (Based on Profitability)	% of households growing
Bambara Nuts	590,000	59%	143%	1	8.7
Citrus	562,000	*28.1%	*38%	2	51
Rice	536,000	53.1%	114%	3	28.6
Sesame (Simsim)	430,500	71.6%	254%	4	27
Onions	422,500	-	-	5	Negligible
Ground Nuts	336,000	50.9%	150%	6	76
Maize	318,000	63.6%	181%	7	66
Cassava	227,000	48.1%	92%	8	100
Tomatoes	203,000			9	Negligible
Green gram	127,000	42.3%	73%	10	52
Beans	99,000			11	36

[17] This is the gross margin after first season. It's worthwhile pointing out that some equipment costs are incurred in the first season but not in the subsequent season. The gross margins thus improve in the subsequent seasons. These enterprises include like citrus, onions and tomatoes.

*The calculations are based on the second year of fruiting, the gross margins and ROI is expected to increase once the initial fixed and other investment costs have been absorbed.

5.2 Recommendations

5.2.1 Production Aspects

- Development of farmer associations to multiply seed for planting would ensure increased availability, access and affordability of quality seeds, especially improved varieties that are resistant to harsh weather conditions, pests and diseases. These farmer groups need to be offered training and assured market for their seeds. These farmer associations should be linked with and collaborate National Agricultural and Animal Research Institute (NAARI/SAARI).

- Enhance acceptability and use of improved varieties. This can be done by exposing farmers through extensive on farm technology development to test new varieties and involving them in evaluating and selecting suitable varieties for their conditions

- Develop effective seed production and distribution systems among farming communities in collaboration with appropriate public institutions and private seed companies
- Restocking livestock and oxen to enhance production capacity (quantity and quality) through increasing the area under cultivation and improved timeliness of farm operations like land opening and weeding. Apart from tillage, transport and other field operations, work animals can also be used for feeder road maintenance.

- To increase production, farmers should be assured of markets, since lack of markets is a major disincentive to continued production.

- Link farmers to the Savings and Credit Cooperatives that are being established at every sub county in each district, under the Rural Financial Services Programme (RFSP) and Uganda Credit and Savings Cooperative Union (UCSCU). This should be done by organizing farmers to make them bankable.

5.2.2 Market and Marketing Aspects

- Promote market driven agriculture by strengthen the farmer groups and create a change of attitude towards market orientated agricultural practises. Better farmer group organisation and adoption of collective marketing practices will result in amongst others negotiation of better prices as well as other value addition activities like produce bulking. This will also have the advantage of eliminating the category of middlemen who do not add value along the value chain thus increasing the margin available to farmers

- Promote productivity enhancement interventions to increase production to levels sustainable for other markets like the industrial & export markets. Whereas marketing of agricultural produce may be a leading constraint faced by farmers, the quantities produced are still low for them to enjoy sufficient economies of scale and target lucrative industrial and export markets like the Southern Sudan and Kenyan markets. The creation of a common market for the EAC will be a big opportunity for Teso region which lies in close proximity to some of the regional markets like Kenya, Sudan and DRC.

- Negotiate access to credit & work with financial institutions to develop special agricultural loans & products tailored to the rural farmer needs.

- Encourage the farmers to do collective marketing and create marketing economies of scale by constructing produce bulking centres at the sub county or parish levels to enable bulking by farmers (manage crop assembly and bulk marketing)

- Target and develop low cost marketing channels and reduce the influence of middle men especially the hawkers who distort markets prices and lower farm gate prices.

- Promote multi-sector partnerships (PPP) to create integrated market access intervention models which focus on the roles and responsibilities of the actors along the

value chains to be able to increase levels of synergies, create efficiency in resource use and increase returns through creating win-win solutions. This can be a powerful approach to linking farmers to viable markets, alternative financing options and sustainable markets for agricultural products.

6.0 A CASE STUDY MODEL FROM WEST NILE (A POSSIBLE MODEL FOR INTERVENTION)

Sesame (Simsim) was an un recognized back yard crop in West Nile and most parts of Northern Uganda. It was mainly grown by women for food and used as a substitute to grounds for preparation of traditional sauces. The crop had no commercial value in Uganda until the late 1990s and early 2000. Even at household levels it was often reserved for preparation of particular delicacies like ''Ocakuca'' in West Nile and dried mud fish in Teso. Its use was a little more wide spread among the Acholi and the Langi people in Northern Uganda. Following the need to find an alternative commercial crop for farmers in the West Nile region to replace tobacco which is perceived to have serious effects to the environment and health of the farmers, an exploratory market study was conducted to identify potential enterprises and asses their viability in terms of profitability, local capacity to adopt and produce, market potential and cost of production. Sesame scored high in most of these parameters and was ranked highest among three other enterprises namely; groundnuts, cassava and maize. More detailed sub-sector studies were conducted to determine the market and commercialization potential of each of these three enterprises. Sesame demonstrated a strong market potential with a significant international market demand and with a strategic food security role in the domestic and local market. The study also showed that farmers (Women) were retaining at least 70% of the produce for household food needs and selling only 30%. To purchase basic household necessities like salt, soap and medicines.

Care International with support from the Canadian International Development Aid) made a deliberate intervention to transform sesame into a commercial crop for the region as an alternative to tobacco under a project entitled 'The agricultural marketing Initiatives Project'-(AMI). The commercialization process began with organizing farmers into production groups with specific group formation criteria and guidelines some of which included a personal interest to produce for the market, act in a group and commit to collective marketing. Because sesame was a women's crop wining the support of men was

crucial for its success since they determined the allocation of farmland between tobacco and other crops. This was done by forming groups based on household membership with all members of the household belonging to the same group and any or all members of the household were free participate in the group programs. The project then addressed issues of governance in the groups through training and helping set up leadership structures based on democratic principles and these groups formed the basic unit of production. Once the groups were formed they became the vehicle for extension services delivery, technology transfer and information management. The project facilitated training and OD activities, while the farmers paid for seed, worked the fields and committed to attending all trainings both farm based and other forms of training. Groups in each parish came together and elected a parish marketing committee whose role was to compiled inputs needs for all the farmers in the parish at the start of the season to make an aggregated demand list and the project facilitated price negotiations with Naseco seed house and the terms of delivery. Naseco initially offered farmers sesame II seeds at UGX2000 as compared to the retail price of UGX 3,500 in Arua town and delivered to stores hired by the project in Arua for receiving the seed. On the marketing front the project linked the farmer groups to UNO trading company in Uganda a subsidiary of Hakan commodities/ MDC of Dubai which is one of leading exporters of sesame in Uganda and facilitated price negotiations. The farmer marketing committees using farmer's huts as make shift stores donated by members for bulking managed the bulking process and documentation and once a truck load was accumulated in one to two days communication was made to UNO trading company. UNO trading company offered the farmers weighing scales, polyethylene bags for bulking, airtime for communication and transport to pick up the sesame from the farmers bulking centre. Extension services were provided to the farmers by a private company positioned as a social enterprise called ''Nile pro trust'' from site selection to marketing support. The services of Nile pro trust were paid for in two ways; Naseco embedded the cost of extension services in the price of seed by charging an extra UGX200 per kg making the total seed price UGX2,200 per kg and the farmers were made aware of this arrangement and consented to it, Secondly UNO trading company paid a commission of UGX10 per kg for every kg of sesame procured from the farmers through the Nile pro supported bulking arrangement, in short the cost of the extension services to the farmers was met by the market rather than the farmers having

to pay directly from their pockets. In all these cases the project played a brokering and facilitating role. As a result of this intervention over a three year period the following outcomes were achieved;

- Sesame today is a household name a long the River Nile belt and is the number one commercial crop in terms of choice, demand and profitability
- Farmers accessed high quality seed at an affordable rate and Naseco extended a 90 day credit for the farmers guaranteed by Nile pro trust and the project. This allowed farmers to pay for the seed in instalments of 30% in delivery, 40% after 60 days and the 30% after 90 days.
- The farm gate price rose from UGX350 to 700 in the first year then to 1000 in the second and 1,200 in the final year of the project i.e. 2006. Today it is 1500 free lance and UGX2000 at the bulking centre.
- Acreage has grown from a baseline average of 0.5 to 2.0 per household committed to sesame in 2009 baseline.
- Average household incomes attributed to sesame are US$280 from the two acres
- A strong business partnership that has outlived the project was established with the private and is now scaling up to other regions and enterprises like sunflower.
- Sesame has been recognised under the VODP II project as a major oil seed and has been included together with other oilseeds in the Uganda Commodities Exchange floor.
- The input supplier guaranteed quality seed, Nile pro guaranteed extension services support and the buyer guaranteed market and a competitive price which gave farmers the confidence to produce and the marketing committees guaranteed quality.

In summary the key principles that made the transformation of sesame a success in the region and can apply to the Teso case are:

1 Farmers must be organized into coherent production groups based on well define group formation criteria to create market oriented farmer groups

2 Carry out farmer institutional development through tailor made training programs aimed our building group leadership and organizational capability, collective marketing and bargaining techniques and market intelligence capabilities

3 Engage members of the private sector to build market access partnership to ensure that production is driven by well defined markets and responds to markets demand, such partnerships should focus on major produce buyers like exporters, processors, input suppliers and financial institutions for provision of farm credits.

4 Promote collective marketing to create marketing economies of scale and collective input procurements to create production economies of scale by aggregating demand and supply at the farm level.

5 These partnerships must be built on the basis of mutually agreed and shared objectives supported by an MoU between the parties.

6 The parties to the MoU will include the farmer representatives, Africare as the facilitator and the private sector Market partners

To address the above constraints and implement the recommendations stated above we wish to propose an intervention model that can be sustainably applied to develop a market oriented agricultural intervention model based on similar principles and build a development partnership with the private sector that increase access to farm production and market linkages for farm produce from Teso region. We realize from this study similar enterprises like Bambara nuts have lots of parallels with sesame.

The JP Consultants would be very willing to help Africare design a suitable model to suite the Teso context, our team has tremendous experience in the developing these kind of market access models that have registered significant success one of which is the sesame transformation model that turned sesame from a backyard household crop in West Nile to the number commercial crop in the region after Tobacco. Today it is referred to as “white gold”.

Fig. 4 A farmer bulking centre for sesame at Uleppi on Arua –Nebbi highway