

Smallholder pig value chain assessment in Uganda: Results from producer focus group discussions and key informant interviews



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Smallholder pig value-chain assessment in Uganda: Results from producer focus group discussions and key informant interviews

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Acronyms

AHSP	Animal health service providers
ANPPCAN	African Network for the Prevention and Protection against Child Abuse and Neglect
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASF	African swine fever
BRAC	Bangladesh Rural Advancement Committee
BUSODA	Buddu Social Development Association
EADD	East Africa Dairy Development project
EC	European Commission
DVOs	District veterinary officers
FAO	Food and Agriculture Organization of the United Nations
FHU	Food for the Hungry—Uganda
FINCA	Foundation for International Community Assistance
FMD	Foot and mouth disease
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
NAADS	National Agricultural Advisory Services of Uganda
NaLIRRI	National Livestock Resources Research Institute
NARO	National Agricultural Research Organisation of Uganda
SACCO	Saving and credit cooperation organization
SFFF	Safe Food, Fair Food project
SPVCD	Smallholder Pig Value Chain Development
UBOS	Uganda Bureau of Statistics

UGX	Ugandan shilling
USD	United States dollar
VEDCO	Volunteer Efforts for Development Concern
VSLA	Village savings and loans associations
WFP	United Nations World Food Programme

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Executive summary

Background

The CGIAR Research Program on Livestock and Fish identified the smallholder pig value chain in Uganda as a high-potential target to translate research into major interventions that stimulate pro-poor transformation and generate benefits at scale. The program began by engaging with research and development partners, analysing the pig value chain and its policy environment as well as characterizing smallholder pig production and marketing practices in Uganda. These activities were done as part of a project entitled ‘Catalysing the emerging smallholder pig value chains in Uganda to increase rural incomes and assets’, which was funded by the International Fund for Agricultural Development (IFAD) and the European Commission (EC).

A value-chain assessment was conducted with producers in Kamuli, Masaka and Mukono districts to:

- Characterize the pig production and marketing systems
- Identify constraints and opportunities faced by producers
- Identify and select potential interventions for pilot testing
- Identify key elements and variables to consider for producer benchmarking surveys

Methodology

Sites for research and interventions were selected through geographical targeting using GIS characterization which used existing spatial data overlays of pig population density, human poverty levels and market access to depict differences in the districts and variations in the value-chain domains. Three districts, Masaka, Kamuli and Mukono were selected from this analysis. These also matched the three domains identified a priori for the pig value chains, including rural production for rural consumption (‘rural–rural’), rural production for urban consumption (‘rural–urban’) and urban or peri-urban production for urban consumption (‘urban–urban’).

Pig value-chain assessments were conducted in form of producer workshops through farmer focus group discussions in the sample villages. To identify farmers to participate in the group discussions, lists of all pig farmers in each village were prepared by village heads (local council I) and the NAADS (the National Agricultural Advisory Services of Uganda) or local government staff working in those sub-counties. From the lists, a stratified random sample, based on gender, of 40 pig farmers was drawn up for each of the 35 villages. About 1400 pig farmers were covered during the focus group discussions. In addition, seven to nine village leaders from each village were also separately interviewed.

The participatory tools used in the focus group discussions were semi-qualitative in nature and covered different subject domains which included breeds and breeding management, feeding, animal health and management, value-chain mapping, marketing and food safety. Other aspects covered included gender roles and decision making in pig value chains as well as livelihood assessments. Each focus group discussion session covered a specific domain identifying

constraints and opportunities associated with it. The tools used for the pig value-chain assessment were gendered to gain a better understanding of the gender constraints and opportunities in the value chain. The gendered information was used to further identify potential best-bet interventions for piloting.

Key findings

- i. Pig and crop production are important livelihood sources for smallholders and were ranked highest in terms of contribution to household income, by both men and women groups, in all the value-chain domains with a few exceptions in the urban–urban value chains of Mukono district.
- ii. The main objective of pig production is for income generation to meet financial obligations especially school fees payments and improving the welfare of households by enabling them to expand their farms, purchase other livestock and improve family housing. The role of pig manure in improving soil fertility and other uses, such as biogas for lighting and cooking, was also indicated as important.
- iii. Decision making for the crop enterprises in terms of production, marketing and income control largely depended on the objective of production. In all the separate men and women group discussions, it was evident that cash crops were controlled by men, whereas food crops were controlled by women.
- iv. Concerning decision making in the pig enterprise in general, women claimed that most of the activities were undertaken and decisions taken by them exclusively. Men claimed that most of the activities and decision making were a shared responsibility or undertaken jointly by men and women. Activities that were clearly in women’s domain included pig feeding, watering and cleaning of pens, while marketing was mainly in men’s domain. In the urban value chains, most women indicated the enterprise as being theirs and consequently it was their role to carry out activities and make most decisions.
- v. Peak pig income periods were registered in March–April and December for all the sites. This is linked to sales associated with festive seasons such as Easter, Christmas and martyrs’ day.
- vi. In terms of institutional support, the urban–urban and rural–rural value chains of Masaka district mentioned the NAADS for its important role in offering advisory services on modern agricultural practices and livestock management, especially supporting farmer groups and helping them in the acquisition of inputs and piglets, and giving advice on proper housing structures. In some cases, the NAADS supplied some of the house construction materials, while the farmers supplied labour. BRAC, which is a microfinance institution offering group loans to women and individual loans to men at low interest rates, was also highly ranked in some of the sites. In some cases, institutions that support vulnerable groups, such as orphans through school fees payment and purchase of scholastic materials, while also providing families with livestock, such as goats and pigs for free, were also highly ranked, especially in the rural–urban and rural–rural value chains. Such institutions included World Vision and Food for the Hungry—Uganda (FHU). VEDCO, a local NGO was ranked highly in Bugulumbya, Kamuli district where it offers training to farmer groups on improved livestock and agricultural practices, as well as construction of pig housing. VEDCO also provides piglets and feed inputs.
- vii. The common sources of extension services to pig farmers were the NAADS, NGOs (VEDCO and World Vision), other farmers (sharing of information) and animal health service providers (AHSP). Diffusion of extension information through other farmers was common across the sites.
- viii. For pig producer types, exclusive growers and piglet producers/growers were compared more to piglet producers. On average, small-scale piglet producers were defined by the farmers as those that own one–three sows. This was the general trend across all the value-chain domains. In all the value-chain domains,

smallholder piglet producers comprised 50–82% of the households. Small-scale growers were defined as those having one–four grown pigs for slaughter, and comprised 60–80 % of households.

- ix. Generally, the common sales outlet for grown pigs was local (neighbourhood) butchers. The rural–rural value chain domains, especially in Kamuli district (Kitayunjwa, Namwendwa and Bugulumbya) seemed to have fewer alternative market outlets for marketing grown pigs compared to Masaka and Mukono districts. Sales to butchers in other nearby towns were common in the urban–urban value chains, especially in Masaka district.
- x. In terms of price, the highest producer price was offered by the butcher in another town and the least by local butchers, where they commonly sold their animals. Price offers by traders in the rural–urban and urban–urban value chains were relatively high compared to the rural–rural value-chain domain.
- xi. For breeding, most farmers in all the sites obtained breeding services for their pigs from boars owned by other farmers within their villages.
- xii. The desired traits and characteristics for pigs included number of teats (>12–14) which was mostly preferred by piglet producers, while growers/fatteners preferred pigs that are ‘horizontally long enough/good size’ which presumably fetch higher market prices. Further investigation is required on why floppy ears and short mouths were also considered desirable.
- xiii. Intensive and semi-intensive feeding systems were commonly practiced in the urban–urban and rural–urban value-chain sub-counties, regardless of the season. Most pig farmers sourced their feeds from feed millers—mainly to obtain maize bran. Masaka district had the highest proportion of commercial concentrates in the diets, ranging from 25% to 30%, though concentrates use was lower between March and May when forage use in diets was highest. In Mukono, forages (natural or planted) and kitchen leftovers were the main components in the diet. In Kamuli, forages and concentrates were the main components, comprising 30% and 35% respectively. Regardless of the value-chain domain and sub-county, the most preferred forage source was sweetpotato vines followed by cassava leaves.
- xiv. The free-range scavenging system was mainly practiced by 17–18% of farmers in rural–rural and rural–urban value chains where more space was available and animals were less exposed to vehicles. Confinement in corrals (intensive) was common in urban–urban value-chain domains with 86% of households practicing it. About 62% of respondents in the rural–rural domain and 40% in the rural–urban domain practiced tethering.
- xv. The most common husbandry practice was deworming. It was a common practice for 93% of farmers interviewed and this was usually done at least once before the pigs were sold or slaughtered. Farmers believe that deworming results in fast growth.
- xvi. Common sources of drinking water for livestock include boreholes, wells, rainwater, springs, residual water after other uses (waste water), and tap water. The latter is common only in the urban/peri-urban areas. Some farmers in rural areas alluded to giving urine to pigs to drink. Most farmers (30–60%), regardless of the value chain domain and district, gave water to the pigs twice a day.
- xvii. Common pig health problems included African swine fever (ASF) disease and parasite infections especially worms and mange. ASF was the most critical, resulting in a fatality rate of 77.5%.
- xviii. Common livestock products consumed in villages included pork, chicken, goat and beef meat, as well as cow milk. Eggs were explicitly mentioned in all villages except one in Mukono district. Although pork was considered tasty by the respondents, they indicated that it might cause heart disease, especially if the fat layer is too thick. Consumption is highest in December and April, mainly associated with Christian festivities of

Christmas and Easter. In Mukono, another peak was observed in May and June due to the celebration of martyrs' day held in early June at Namugongo in Wakiso district which neighbours Mukono.

- xix. In terms of price, the highest producer price was offered by butchers in another town and the least by local butchers. Prices offered by traders in the rural–urban and urban–urban value chains were relatively high compared to the rural–rural value-chain domain.

Constraints

- a) Approximately 70% of respondents claimed that the low availability of inputs and veterinary services was the most notable constraint. About 90% of respondents claimed that inputs and veterinary services were costly. In some of the value chains, the poor quality of inputs, especially feeds, as well as input price fluctuations were important constraints. Key informant interviews revealed that veterinary services were very scarce and only one parish (Busota) in Kamuli district reported to have received veterinary and extension services from a couple of para-veterinarians.
- b) Major constraints associated with the use of more inputs were the unavailability of inputs, lack of financial resources to purchase more and low prices of outputs (live pigs) vis-à-vis the high prices of inputs. This latter lowers pig farmers' profit margins and thereby discourages them from investing more into purchased inputs.
- c) For product sales, farmers indicated that within their localities, there were few buyers of their pigs and piglets. Those that are there do not offer competitive prices to farmers. Furthermore, most pig farmers sell their pigs to the same (local) buyers leading to a glut in the pig market especially just before schools re-open, further depressing the market prices. Some farmers exhibited a tendency to accept any price offered in order to meet their immediate financial obligations.
- d) Farmers said that traders operated cartels which collude in setting prices, thereby hindering pig farmers from negotiating for better prices. A lack of market information especially on prices, alternative market outlets and consumer preferences was indicated by respondents in most sub-counties of the urban–urban domain as a key constraint.
- e) Feeding is one of the main constraints in smallholder pig production systems, due to seasonal variability in the availability and quality of feeds. Farmers generally lack the capacity to develop nutritionally balanced least-cost rations or strategic supplementation of fodder-based diets.
- f) Swill feeding—feeding pigs on kitchen leftovers from hotels, restaurants and schools for example—is the most common feeding system followed, especially in peri-urban areas. From these sources, farmers identified the presence of harmful objects (glass, plastic bags) as important risks with this type of feed. These sources were also identified as potential transmission avenues for ASF.
- g) For breeding, constraints focused on aspects of reproduction (i.e. abortion), piglet survival (i.e. lactating sows lacking milk, sows eating piglets, sows sleeping on piglets), or herd health issues (diseases).
- h) In terms of management and pig health, the main constraints were poor housing and a lack of knowledge of good management practices. ASF was highest ranked by farmers as the disease that causes high mortality in pigs. This ranking of diseases was based on farmer perceptions. A critical additional area was the presence of co-infestations with other porcine pathogens, including ectoparasites and helminths which were identified by farmers as endemic in pigs in Uganda.
- i) There was weak coordination in the pig value chain. A few actors are engaged in some form of formal or informal contractual arrangements; organizations (NGOs, research, development projects) and line ministries of the central government play limited supporting roles.

- j) Smallholder pig production is ranked low in Uganda's national agenda as contained in the Development Strategy and Investment Plan, hence there is lack of a targeted policy for the subsector.

Recommendations

The following interventions are suggested to improve the smallholder pig value chain in Uganda:

- To overcome constraints associated with input availability, affordability and quality, farmers are encouraged to foster collective action in input sourcing and purchase. This will lower the risks of adulteration and purchase of ineffective inputs and lower unit costs. Collective action requires that farmers join groups through which they purchase inputs and sell at better prices. The groups also facilitate access to support services, such as extension, veterinary services and credit. However, farmers' capacities in group dynamics and management have to be built concurrently in order for this intervention to be effective.
- To overcome sales constraints, farmers ought to have access to sufficient market information to make informed decisions on when, where, to whom and at what price they should sell their products profitably. Farmers' capacities to access and interpret market information have to be boosted.
- To address feed constraints, farmers' capacities in feed formulation and alternative feed resources should be built up so they can meet the feed requirements of animals year round and in a profitable manner. This may mean exploiting opportunities for fodder, crop residues and kitchen leftovers as feeds.
- To strengthen value-chain coordination, efforts to support and foster linkages among pig value-chain actors need to be reinforced. Producer organizations need to be strengthened, while linking them to input suppliers, as well as output markets or potential opportunities. Service providers (extension, credit, veterinary), as well as policy makers, should be well integrated with the producer associations.
- Capacity building and training of farmers on best management practices and biosecurity measures for controlling ASF diseases is needed.
- A policy advocacy forum should be formulated to influence policies favourable to smallholder pig value-chain development at district and national levels.
- Efforts to develop a vaccine for ASF should be stepped up.
- Affordable rapid diagnostic tools for the most common diseases are also needed along with implementation of biosecurity measures along the value chain.

Further research

The following areas require further research:

- Use of forages and crop residues as feed resources is still underexploited as they are currently only used after harvesting periods due to their perishability when not properly preserved as silage. Further research on their toxicity, processing and preservation may lead to an increase in their utilization as feed.
- Further investigation is required on the desirable traits of pigs (e.g. why floppy ears and short mouths are considered desirable).
- Efforts to develop a vaccine for ASF should be stepped up.
- Work is also needed on the burden of globally important diseases apart from ASF. These include foot and mouth disease, diarrhoea, porcine reproductive and respiratory syndromes (PRRS), and porcine coronavirus.

It may be vital to assess the socio-economic impact of ASF along the value chain to quantify and highlight the associated losses.

Introduction

Significance of the pig value chain

Although the agriculture sector employs about 70% of the population in Uganda, its growth in recent years (averagely 1.3% per annum for period 2005–2012) has remained lower than the population growth rate estimated at 3.2% per annum over the same period (The East African 2013). Agricultural growth is an important instrument for poverty reduction and can be at least three times more effective in doing so compared to other sectors of the economy combined (de Janvry and Sadoulet 2010).

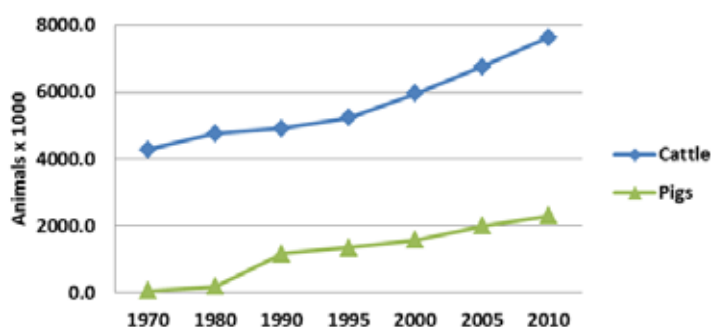
In this context, recent studies in Uganda show that access to productive assets, including all types of livestock, can provide rural households with a tremendous opportunity to generate income and to move out of poverty (Lawson et al. 2006). Not only do livestock and livestock products play an important role in income generation, they are also sources of high quality protein and micronutrients such as vitamin A, vitamin B12, zinc, and especially heme iron which is more readily absorbed.

In Uganda, production and consumption of livestock and livestock products has been growing rapidly with greatest growth observed in the pig sector. This growth is essentially driven by increase in population, urbanization and wealth, alongside improvements in animal health control and government projects promoting growth of the livestock sector (ILRI 2012). Pig and poultry are quite responsive to increases in demand and this has resulted into the global livestock revolution seen today (Delgado 1999). Despite this growth, food and nutritional security are still below the recommended level with almost 48% of Ugandans being energy deficient, implying that they are unable to have a regular diet which provides the minimum energy required to lead an active and healthy life (UBOS, WFP 2013).

Through an in-depth screening process, ILRI identified the pig sector in Uganda as one of nine value-chain projects under the CGIAR Research Program on Livestock and Fish where research investments were most likely to make a major difference to the livelihoods and diets of poor people (CGIAR Research Program on Livestock and Fish 2013). Since 2011, the Smallholder Pig Value Chain Development (SPVCD) project has been conducting research on the performance of the pig value chain, its challenges and opportunities for enhancing the pork sector. Based on research findings identified so far, best-bets for future research will focus on generating evidence for wider applicability to benefit families involved in the pig value chain in Uganda.

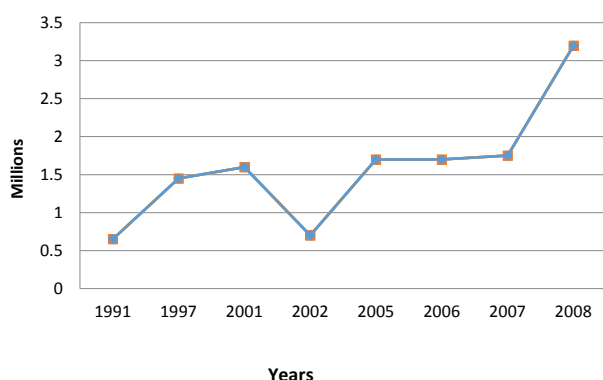
Estimates of the pig population vary considerably depending on the sources (Figures 1 and 2). The estimates of pig numbers depicted by FAO are below what was established in the livestock census conducted in February 2008 by MAAIF–UBOS. This census estimated the national pig herd for Uganda to be 3.2 million as of 2008. Regionally, the Central region had the highest number of pigs estimated to be 1.3 million (41%), followed by Western region with 0.78 million (24%), then Eastern region with 0.7 million (22%), and Northern region with 0.34 million (11%), while the Karamoja subregion had the least number of pigs estimated to be 0.06 million (2%) (MAAIF–UBOS 2009).

Figure 1. Changes in cattle and pig population in Uganda for the period 1970–2010.



Source: FAO (2011).

Figure 2. Changes in pig population in Uganda for the period 1991–2008.



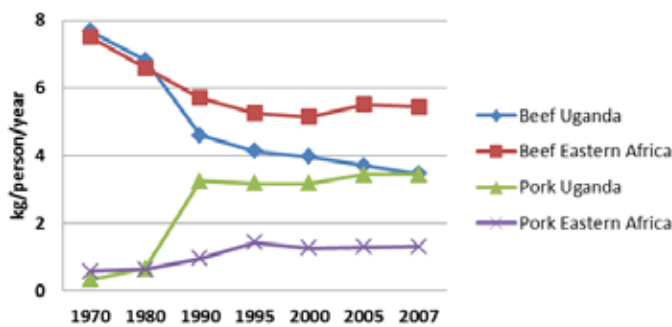
Source: MAAIF-UBOS (2009).

In spite of its growth, the pig sector in Uganda has been quite neglected and is not among the priority enterprises selected under the Ugandan Agriculture Sector Development Strategy and Investment Plan for 2010–11 to 2014–15. According to a stakeholders' meeting held in Kampala in 2013, the main underlying cause for government not to prioritize the pig sector is lack of evidence of the full scope and potential of the industry and misconceptions about pigs being dirty animals (CGIAR Research Program on Livestock and Fish 2013).

The proportion of female-headed households owning pigs in Uganda has increased significantly in the last 10 years, from 15% to 32%, whereas the male-headed households with pigs have increased from 21% to 31% (MAAIF-UBOS 2009). Regardless of who heads a household, it is widely agreed that women and children actively participate in managing pigs and other small animals that are reared in homesteads. Interventions that specifically target women for improved livestock husbandry practices should be able to increase not only production but also community-level availability of animal products which is vital for poverty reduction, economic growth, and food and nutrition security.

The average per capita consumption of pork in Uganda (3.4kg/person/year) is almost two times higher than what it is in all other East African countries and it is the highest in sub-Saharan Africa, including South Africa (FAO 2011). Moreover, whereas the consumption of pork in Uganda sharply increased just before 1990, possibly resulting from peace consolidation due to changes in political regime, the consumption of beef has declined, and in 2007 both reached the same level (Figure 3). The net result has been that meat consumption per capita in Uganda has remained at a low level of 10–11kg per person per year, yet meat consumption in developing countries has been continuously increasing from a modest average annual per capita consumption of 10kg in the 1960s to 26kg in 2000 and is expected to reach 37kg around the year 2030 (FAO 2013).

Figure 3. Dynamics of per capita consumption of beef and pork in Uganda and Eastern African, between 1970 and 2007.



Source: FAO (2011).

Pork consumption, though popular, remains well below the levels needed to achieve adequate intake of the critical nutrients that meat can provide. The study conducted by ILRI in 2012 confirmed that pork is frequently consumed and consumption is highest during periods of low food availability, hence increasing its potential to contribute to nutritional security (Tatwangire 2014)). Improving pork production among smallholder farmers is expected to increase availability of affordable pork to poor households through sales in rural communities and urban markets. Increased pork production strategies if combined with appropriate nutritional messages is expected to give poor households better access to this high-quality source of nutrients and promote increased consumption among the most nutritionally challenged households.

The nutritional and health benefits for pig-producing households are not expected to arise primarily from increased consumption of their own pigs, but rather through income generated from pig and pig product sales. Poor households exhibit a high propensity to spend increased income on food, often in the form of a more diverse selection of food products hence improving the quality and diversity of their diets. Besides pig income being considered as an important contributor to household income, (Tatwangire 2014), several studies have shown that strong linkages exist between household disposable income, food intake and nutrition status, especially when reinforced with nutrition and health education interventions (Pinstrup-Andersen et al. 1990).

During the assessment phase of the Livestock and Fish program engagement in Uganda, several productivity, marketing and capacity related constraints were identified along the smallholder pig value chain. These constraints limit the chain's potential to contribute to livelihoods of the poor. In terms of feeding, there is lack of an all-year-round stable feed supply and poor implementation of feed quality control measures (Tatwangire 2014). For pig health, presence of frequent outbreaks of African swine fever and foot and mouth disease (FMD) has caused significant losses. Parasitic diseases have also affected the economy of pig farming and hence impact negatively on smallholder farmers since pigs are important assets in poor households. Zoonotic diseases, such as brucellosis, erysipelas and salmonellosis, are largely unexamined but do present important health burdens for pigs and people. A lack of knowledge on zoonotic diseases, coupled with poor practices in slaughtering, processing and commercialization of pork meat, result in occupational risks for pork handlers and food safety risks for consumers.

Poor housing, and a lack of it in some instances, does not allow for the efficient collection and utilization of manure and could contribute to water-source pollution which affects animal welfare and hygiene. A much more important source of environmental contamination is the waste disposal from poorly run urban and peri-urban abattoirs and butchers. Poor market infrastructure and weak institutional arrangements, together with an under-developed marketing system, limit smallholder farmers' access to inputs and as a result, middlemen who offer these services charge exorbitant prices which impacts negatively on the profit margins of pig farmers. Furthermore, limited opportunities for knowledge sharing between producers, public officials, development agents, and scientists often result in limited uptake of proven technologies.

In recent years, there have been some localized efforts by the government through the National Agriculture Advisory Service (NAADS) in conjunction with local governments, as well as by NGOs such as Volunteer Efforts for Development Concern (VEDCO) and World Vision, to promote intensification in order to increase productivity, control disease risks, reduce conflicts with neighbours and to mitigate negative environmental impacts, particularly in water sources. However, the coverage of those interventions has been limited and sometimes the approaches applied do not fully respond to market forces and farmers' needs and expectations.

Given this background, the recently initiated CGIAR Research Program on Livestock and Fish identified the smallholder pig value chain in Uganda as a high-potential target. The goal of the program is to translate research into major interventions that stimulate pro-poor transformation of selected livestock and fish value chains and generate benefits at scale. The program began by engaging with research and development partners, analysing the pig value chain and its policy environment as well as characterizing smallholder pig production and marketing practices in Uganda. These activities have been done as part of a project entitled 'Catalysing the emerging smallholder pig value chains in Uganda to increase rural incomes and assets', which is funded by the International Fund for Agricultural Development (IFAD) and the European Commission (EC).

The SPVCD project complements other ongoing ILRI research in Uganda with public sector and university partners to address specific constraints related to African swine fever and food safety associated with informally-traded pork products (ASFU 2013). The project also draws on ILRI's track record in research on pig systems in Asia.

Objectives of the value-chain assessment

In 2013, the ILRI-led pig value-chain project in Uganda conducted a value-chain assessment with producers in Kamuli, Masaka and Mukono districts. The objectives of the value-chain assessment were to:

- Describe the pig production and marketing systems
- Identify the constraints and opportunities faced by producers
- Identify and select potential interventions for pilot testing
- Identify key elements and variables to consider for producer benchmarking surveys

Identify key elements and variables to consider for producer benchmarking surveys

Various pig production systems exist in Uganda. Some pig farmers confine their animals in structures such as this.

Methodology

Site selection

In order to identify potential districts to be targeted for the pig value-chain assessment work in Uganda, geographical targeting, using GIS characterization, was applied by utilizing existing spatial data. Specifically, data overlays of pig population density, human poverty levels, and market access were used to depict differences in the districts and variations in the value-chain domains¹ (van de Steeg et al. 2012). Data on pig population density was derived from the 2008 livestock census report, while the poverty levels, based on head count ratios, were derived from the human population census data, gridded population maps and the national poverty lines. Time taken to reach the nearest urban centre was used to proxy market access and served an important role in classifying the districts into different value-chain domains (Annex 8.1). From the GIS characterization, 10 districts located in Central, Western and Eastern regions were identified as potential sites for the pig value-chain assessment work, as they met the GIS criteria (Annex 1).

The next step in the site selection process involved stakeholder consultations through a 'site selection' workshop (Ochola 2013). The stakeholders included NARO-NaLIRRI, local and international NGOs, Ministry of Planning, NAADS, district local government authorities; specifically the district veterinary officers (DVOs) of various districts, pig farmers and traders associations, and representatives from various departments in the Faculty of Agriculture of Makerere and Gulu Universities. The objectives of the stakeholder consultation were to validate the site selection results from the GIS characterization, to define 'soft criteria' to be used in the final selection process and to propose a list of eligible districts that match the GIS and the 'soft criteria'. The stakeholders identified four soft criteria to be included in the site selection process. These included potentials for partnerships especially with ongoing complimentary projects, districts with high disease burden in pigs, since this is a common factor that limit productivity, current input market linkages, especially access to input service providers and geographical access of the area all year round.

The stakeholders identified more sites that were excluded from the GIS characterization but fitted well with consideration of the 'soft criteria'. They then scored the districts against the GIS and the 'soft' criteria (Annex 2). Districts with highest scores were taken up by SPVCD project, while the remaining sites that still fitted well in the GIS characterization were considered as potential sites for the overall Livestock and Fish value-chain work (Table 1). Although most districts in the Western region fitted in the GIS characterization criteria, they were not considered for the SPVCD project work due to the short duration of the project and the need to consolidate activities and maximize on pilot interventions within a limited spatial coverage to facilitate learning before going full scale. Districts in the Western region were, therefore, not considered for the site scoring exercise during the workshop.

1. Value-chain domains are classified based on location and purpose. Three such domains have been identified a priori for the pig systems and include rural production for rural consumption (rural-rural), rural production for urban consumption (rural-urban) and urban or peri-urban production for urban consumption (urban-urban).

Table 1. Stakeholder site selection scores for pig value chain work in Uganda

District name	Fitness to the GIS criteria	Soft criteria				Total votes	Rank
		Partnership potential	Disease burden in pigs	Access to input/ service providers	Geographical access		
Kumi	Yes	2	2	2	6	12	7
Tororo	Yes	4	2	1	2	9	9
Soroti	Yes	3	2	2	3	10	8
Kamuli	No—low pig density but high poverty levels	15	7	10	9	41	4
Lira	No—high poverty levels, lucrative neighbouring markets	7	10	8	7	32	6
Gulu	No—high poverty levels, low pig density due to ASF	10	10	10	8	38	5
Wakiso	No—high pig density but low poverty levels	15	14	14	13	56	2
Mukono	Yes	15	9	14	9	47	3
Kayunga	Yes	0	4	1	1	6	10
Masaka	No—high pig density but low poverty levels	18	21	16	20	75	1

Source: Ochola (2013).

From the stakeholder consultation, three districts were identified for the SPVCD project work. These included Masaka, Kamuli and Mukono. Although some of these districts fell off from the GIS characterization, they were considered as potential sites for SPVCD project due to the strong existing partnerships and on-going pig value chain work that would complement the project efforts. Wakiso district was ranked highly but since its value chain typology is similar to that found in Mukono, the latter was selected as it also fitted within the GIS characterization.

In order to identify locations within the selected districts where the pig value chain activities would be conducted, a further assessment was done using pig population data at subcounty level from the livestock census data of 2008. For each district, four–six subcounties with high pig population were selected for further scrutiny of the existing value chain domains. Consultations to identify the value chain domains within the subcounties was done with partners on the ground especially the DVOs, NAADS staff and local NGOs in each selected districts since some had more than one dominant domain. A minimum checklist was developed and administered to a few farmers and actors during site scoping studies to validate the value chain domains in each subcounty and also identify villages to be targeted for the value chain activities. For each district, two subcounties were selected to represent each value chain domain type. Within each selected subcounty, two to three villages were randomly selected for the pig value chain activities. A total of 35 villages were selected for the value chain assessment activities. Table 2 shows the selected subcounties and the corresponding value chain domain types.

Table 2. Selected subcounties and value-chain domains

District	County	Subcounty	Dominant value chain domain	No. of villages sampled
Masaka	Bukoto	Kkingo	Rural–rural	3
	Bukoto	Kyanamukaka	Rural–rural	3
	Bukoto	Kabonera	Rural–urban	3
	Masaka municipality	Kimanya-Kyabakuza*	Urban–urban	2
	Masaka municipality	Katwe-Butego*	Urban–urban	2
	Masaka municipality	Nyendo-Ssenyange*	Urban–urban	2
Kamuli	Bugabula	Kitayunjwa	Rural–rural	2
	Bugabula	Namwendwa	Rural–rural	2
	Buzaaya	Bugulumbya**	Rural–rural	4
Mukono	Mukono	Mukono town	Urban–urban	2
	Mukono	Goma	Urban–urban	2
	Mukono	Kyampisi	Rural–urban	4
	Mukono	Ntenjeru	Rural–rural	4

Notes:

*All three subcounties of Masaka municipality, largely representing a peri-urban–urban value chain, were selected for the pig value chain assessment as each represented a different type of production system and the levels of institutional involvement in the pig value chain varied greatly. For instance, in Katwe-Butego subcounty there are women groups involved in some form of collective pig production with NAADS offering extension support.

**The dominant value-chain domain in all the selected subcounties of Kamuli district is rural–rural. VEDCO, which is one of SPVCD’s project partners in the district, is working in some of the parishes and villages in Bugulumbya subcounty on pig value-chain activities. Therefore for Bugulumbya subcounty, two villages where VEDCO operates and another two where it does not were randomly selected for the pig value-chain activities.

Sampling

The producer pig value-chain assessments were conducted in the form of producer workshops through farmer focus group discussions in their local settings, such as schools or churches in the sampled villages. In order to identify farmers to participate in the group discussions, lists of all pig farmers in each village were prepared by the village head and the NAADS or local government staff working in those subcounties. From the list, a stratified random sample of 40 pig farmers per village, based on gender was drawn. A total of about 1400 pig farmers from 35 villages were covered during the focus group discussions. In addition, about seven to nine village leaders from each village were also separately interviewed.

The farmer focus group discussions were conducted in four parallel sessions per village covering different subject domains including feeds, breeds, animal health, value chain mapping and marketing, and food safety. Each session had a total of about 10 farmers. A fifth parallel session with village leaders was also conducted. These sessions were held for one day in each of the selected villages.

Information on the study sites

Key informant interviews were held with opinion leaders, both men and women, in each of the sites where the project was implemented. Several aspects were investigated and they included natural resources available, land ownership, land use, status of physical infrastructure, social infrastructure, NGOs and government agencies operating in these areas, wealth distribution, sources of credit and status of livestock enterprises with particular focus on pigs. Summaries of the findings in each district (project site) are presented in annexes 10, 11 and 12.

Key informant interview in Mukono



Credit: ILRI/Emily Ouma.

Village resource map for Ntawo ward



Credit: ILRI/Emily Ouma.

Water: All three districts are endowed with water resources, including springs, wells and some with rivers and swamps. These are reliable water sources for livestock even during dry seasons.

Land tenure: In Mukono, common land tenure systems included private mailo land, public land, church owned land, Buganda Kingdom land and Bibanja² holdings. In Masaka, prevalent tenure systems included private mailo land, public land, Bibanja holdings and Buganda Kingdom land. In Kamuli, the customary system was most prevalent.

Crop production: Banana, coffee and cassava production were predominant in all three districts, although other prominent cropping enterprises included vanilla and sugar cane in Mukono and Kamuli districts. Sugar cane production has become prominent in Kamuli due to the newly constructed sugar factory in the area.

Infrastructure: Major highways cross parts of Mukono and Masaka districts, thereby stimulating trade along the roads. Mukono town is a typical metropolitan area with a good tarmac road network. Both of these sites have reasonable murrum road networks which reach villages in the interior. Kamuli has predominantly murrum roads which are under rehabilitation.

Output markets and abattoirs: Kamuli and Masaka districts have few crop output markets and no pig abattoirs. Pig slaughters are carried on an ad hoc basis within the villages except in Kamuli where there is a central slaughter ground though without facilities, but basic pig inspection by veterinary officers takes place. In Mukono, although there are no abattoirs, the situation is quite different, as there are several butchers and some slaughtering slabs owned and operated by large-scale pig farmers.

2. Bibanja refers to persons who occupy land owned by someone with a title to whom they pay rent. Once they've been on the land for more than 20 years, they become bonafide occupants who can only be evicted after negotiation, consent and compensation.

A typical backyard slaughter



Credit: ILRI/Danilo Pezo.

Central slaughter ground in Kamuli



Credit: ILRI/Danilo Pezo.

Financial credit: Mukono reported the highest presence of financial institutions operating within the district and these include several banks namely: Finance Trust Bank, Barclays, Stanbic, Centenary, Global Trust, Crane, Baroda, Bank of Africa, which mainly operate in the town. In Masaka district, few credit providers were reported, this included few saving and credit cooperation organizations (SACCOs) and some village savings and loans associations (VSLAs). Similarly, Kamuli mainly relied on VSLAs which are supported by some NGOs (Plan Uganda and the Bangladesh Rural Advancement Committee (BRAC)) as the main sources of credit to farmers.

Supportive institutions—NGOs and other agencies: Mukono reported the highest number of NGOs and agencies. These include NAADS, BRAC, Send a Cow, Heifer International/East Africa Dairy Development project (EADD), Food for the Hungry—Uganda (FHU), Sasakawa Global 2000, VEDCO, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and Agro Genetic Technologies. Most of these rendered support to livestock farmers in terms of extension and veterinary services. In Mukono, NAADS is a major buyer of piglets for distribution amongst its clients. In Masaka, the most active agencies or NGOs included NAADS, World Vision, Child Care International, Caritas-Masaka Diocesan Development Organisation (Caritas-MADDO), Rotary Club, Buddu Social Development Association (BUSODA), Compassion International, ANAWEZA, Medical Research Council, Aid Child, Vi Agroforestry, Kitovu Mobile, BRAC, the African Network for the Prevention and Protection against Child Abuse and Neglect (ANPPCAN), Goal and a community development project run at the subcounty by the local government. Few of these agencies support livestock except NAADS which offers extension and some advisory services. In Kamuli, the agencies include NAADS, Africa2000Network, Plan Uganda, VEDCO, International Red Cross, Hospice, Heifer International and BRAC. NAADS mostly supply piglets and advisory services, especially in Namwendwa subcounty.

Shocks affecting livestock enterprises: In all the three districts, pig production had registered growth increases of three to fivefold over the past 10 years. African swine fever was reported as the most notorious disease in all the sites and most farmers sell off their animals as soon as an outbreak occurred.

Assessment design

The participatory appraisal tools applied during farmer focus group discussions were developed through working group consultations with scientists from different disciplinary domains from the various CGIAR centres involved in the Livestock and Fish Research Program. The tools were semi-qualitative in nature and covered different subject domains. The domains covered included breeds and breeding management, feeding, animal health, epidemiology, value chain mapping, marketing and food safety. Other aspects covered included gender roles and decision making in the livestock and fish value chains, as well as livelihood assessment. Most of the tools were gendered and harmonised across the different livestock and fish value chains led by ILRI teams and were made available in the livestock and fish wikispace (livestock-fish.wikispaces.com/).

The harmonized tools were adapted to the Uganda pig value-chain context and pre-tested to assess adequacy and applicability. The tools were further refined after the pre-test and learning experience from other pig value-chain projects conducted by ILRI in Uganda, especially the Livestock Data Innovation Project (LDIP). The focus group discussions were conducted by a total of 9 facilitators (3 women and 6 men) per village who were recruited and well trained on PRA tools and gendered value-chain assessments for the five different subject domains. After being trained, the facilitators pre-tested the tools in one village in Wakiso district for comprehension and timing estimations to enable the drawing of a workable timetable for the value-chain assessments. The facilitators worked under close supervision of a multidisciplinary team from the SPVCD and Safe Food Fair Food (SFFF) projects, comprising veterinary scientists, animal nutritionist, and an agricultural economist. GPS readings of each of the 35 villages were taken and the readings will be used for further targeting work.

Arrangements and schedule

In each village, farmer focus group discussions for the pig value-chain assessment were conducted in four parallel sessions beginning at 10:00 am. Before the formation of groups, local leaders welcomed the members and the project team and thereafter described the project objectives and aims of the value-chain assessments. There was an introductory session in the plenary to explain the purpose of the event, and how sessions were to be organized. Four groups were then formed each comprising about 10 farmers with a representative proportion of men and women based on the sample. Each group had two facilitators whereby the role of one of them was to lead the discussions while the other had to take notes. In the morning sessions, each group started with generalities for climate setting (see Annex 4). This comprised aspects such as objectives of pig keeping, description of pig production systems and institutional interactions with communities. After the generalities, each group then dwelt on specific subject domains.

The first group participated in a discussion focussing on processes involved in the pig value chain, the place of male and female producers in the value chain and constraints, as well as opportunities, faced by producers in those processes. An interactive diagram-based process was used. The second group participated in discussions revolving around animal health issues in the pig value chain and associated constraints, as well as opportunities, for interventions. The third group discussed issues related to use of different types of pig breeds, in addition to their breeding management. They also discussed feed issues focusing on seasonal feed availability, use, conservation and quality, and constraints and opportunities for intervention. The fourth group discussed pork consumption aspects including preparation, knowledge, attitudes and practices, as well as perceptions on public health risks associated with its consumption.

There was an additional parallel group session comprising seven–nine village leaders who mapped out the resources in their villages including natural, social, financial resources and infrastructural services in order to provide a contextual understanding on the plentiful and scarce village resources.³ The group also discussed past covariate shocks and coping strategies employed by communities. The village leaders comprised the head of the village, agronomists, farmer fora leaders, and women group and youth leaders.

In the early part of afternoon, there was a plenary session bringing all groups together to present the results from their discussions on constraints and opportunities associated with each of the subject domains. This was a very useful forum to validate the identified constraints and opportunities in a larger forum, while also giving an opportunity to all participants to provide further contribution. After the plenary, the last session comprising different gender groups was organized. Four groups were formed, two comprising men and two women only. One gender group, men and women group separately, discussed the gender roles in pig production and marketing, while the other deliberated on decision making in livestock value chains and the important livelihood activities and income sources for each gender. The sessions ended in the evening at about 5.00pm with a vote of thanks from the local leadership.

³. The village leaders' discussions were led by the district veterinary officer for Masaka and Mukono districts, while in Kamuli these were led by a field staff from VEDCO.

Treatment of gender

Most tools used for the pig value chain assessment were gendered in order to gain an understanding on the differential gender constraints and opportunities in the value chain. This gendered information was used to further identify and test the best-bet interventions. The sampling process to identify the participants in the focus group discussions also placed gender into consideration by randomly sampling men and women pig farmers based on their proportions in the population. This process was also carried out in the group formation processes for the pig value chain assessments.

Data recording and analysis

Although tools used were semi-qualitative in nature, all data were recorded in data entry sheets by the note-takers and entered into an MS Access database by three of the facilitators. The data was cleaned and analysed by SPVCD and SFFF project staff using different software for descriptive analysis. Cluster analysis was done using STATA Version 11.

Challenges

Although we managed to obtain a lot of information on the pig value chain, time limited how much detail could be obtained. Thus, although most of the tools were gendered, additional steps are required to fully understand how and why men and women engage the way they do in the value chain and to shed more light on power relations among producers. Further studies will be conducted using gender transformative approaches (GTA) to assess these gaps.

Administration of the tools required about five–six hours, thereby requiring exceptionally good facilitation skills to maintain appropriate participation levels. We overcame this through thorough screening and training of the facilitators.

GIS techniques and further scoping surveys were used to identify the various value chain domains at subcounty level based on market access measures. However, some of the value chain assessment results, based on the identified domains, showed large variations within a subcounty. Future efforts to characterize the various value chain domains may require lower administrative level resolutions, possibly at the level of parishes.

Results

Sources of livelihoods

In general, the major sources of livelihood for both men and women were livestock production (with pigs on top) followed by crop production, then retail business followed by crafts then construction, then beauty salon business and lastly casual labour (Tables 3 and 4). In terms of contribution to household income, pig and crop production were ranked highest by the men groups in all the value-chain domains apart from Mukono town and Goma both in the urban–urban value chains of Mukono district (Table 3). In these sub-counties, income from other livestock especially cattle and poultry, as well as construction work, brick making and sand mining, ranked highest. Crops such as coffee and pineapple, contributed significantly to household income. Pineapples were cultivated specifically for commercial purposes in Kyanamukaka sub-county of Masaka district, targeting lucrative urban markets in Uganda and neighbouring countries. The male groups mentioned new livelihood activities which include boda-boda,⁴ mobile money⁵ and brick making. Pig rearing was also a relatively new activity and was appreciated by the farmers due to possibilities of getting quick returns as a result of their fast growth.

Table 3. Livelihood sources, rankings for the mens' groups

Livelihood source	Rural–rural				Rural–urban				Urban–urban				N	
	Kkingo	Kyanamukaka	Kitayunjwa	Namwendwa	Bugulumbya	Ntenjeru	Kabonera	Kyampisi	Kimanya-Kyabakuza	Katwe-Butego	Nyendo-Ssenyange	Mukono town		Goma
Crop production	2.0	1.0	1.5	1.0	1.2	1.0	1.0	1.3	1.5	1.0	1.0	5.0	3.0	28
Pig production	1.0	2.5	1.5	2.0	1.0	2.0	2.5	2.5	1.0	2.0	2.0	2.0	4.0	25
Other livestock	3.0	3.0	2.0	2.5	2.3	3.0	4.0	4.0	3.0	3.0	4.0	1.0	5.0	28
Construction	N/A	N/A	3.5	4.0	3.0	4.0	6.0	4.5	4.0	4.5	5.0	5.5	2.0	16
Retail business	4.0	4.0	4.0	3.0	3.5	4.5	2.5	4.3	3.0	N/A	4.0	3.0	N/A	20

Notes:

Highest rank = 1

There were a number of other livelihood sources that were common in specific locations but for brevity reasons are not included in the table. They are numerated below:

1. Fishing is also mentioned in Kyanamukaka and ranked second.
2. Alcohol brewing (using local staples such as banana, millet, cassava) featured as an important activity in Kimanya-Kyabakuza and Katwe-Butego and ranked fifth.
3. Casual labour (on other farms) was mentioned in Kkingo, Kyampisi and Kimanya-Kyabakuza and ranked fourth.
4. Rentals were important in the urban–urban (Mukono town and Nyendo-Ssenyange) and ranked second and third respectively.
5. Charcoal burning and boda-boda businesses were also mentioned in four of the sub-counties, though they were ranked low.

4. Transporting passengers on motorcycles..

5. Charges made from sending or receiving money via mobile phone between sender and receiver..

Table 4. Livelihood sources, rankings for the womens' groups

Livelihood source	Rural–rural					Rural–urban				Urban–urban				N
	Kkingo	Kyanamukaka	Kitayunjwa	Namwendwa	Bugulumbya	Ntenjeru	Kabonera	Kyampisi	Kimanya-Kyabakuza	Katwe-Butego	Nyendo-Ssenyange	Mukono town	Goma	
Retail business	4.0	3.8	3.0	N/A	3.7	4.5	3.3	3.6	3.5	2.7	3.3	3.0	3.0	31
Crop production	2.0	2.0	1.0	2.0	1.0	1.3	1.0	1.3	2.0	3.5	2.5	2.0	N/A	28
Pig production	1.0	1.7	2.5	3.0	2.0	1.7	1.5	2.0	1.0	1.0	1.5	1.0	1.0	30
Other livestock	1.3	2.0	2.5	1.5	2.0	1.7	1.5	2.0	1.0	1.0	N/A	1.0	1.0	29
Craft making	4.0	5.5	4.0	N/A	4.0	3.0	6.3	4.0	N/A	N/A	4.0	5.0	N/A	17
Salon	N/A	N/A	6.0	5.0	N/A	N/A	7.0	6.0	3.0	4.5	3.0	N/A	N/A	9
Casual labourers	3.0	5.0	N/A	N/A	N/A	N/A	N/A	4.5	5.0	4.0	N/A	N/A	N/A	8

Notes:

Highest rank = 1

There were a number of other livelihood sources that were common in specific locations but for brevity reasons are not included in the table. They are numerated below:

1. Bar business was mentioned in nine sub-counties with high rankings of 2.0–2.0 in Kamuli sites.
2. Alcohol brewing featured as an important activity in Kyanamukaka and Kyampisi and ranked third and fifth respectively.
3. Tailoring was ranked low, though many women in eight sub-counties mentioned it as a common livelihood source.
4. Charcoal burning was mentioned in Kimanya-Kyabakuza but was ranked fourth.

Similar to men, the women groups also ranked their major sources of livelihood with retail businesses ranking highest, followed by pig production, then other livestock then crop production, followed by crafts, then salons and lastly hired casual labour (Table 4). Other important livestock types were mainly chicken. Apart from coffee, the women groups also mentioned bananas and maize as important crop income contributors, although banana income was on the decline due to diseases, such as the banana xanthomonas wilt. Retail business emerged as a common and relatively important source of livelihood for women to obtain daily income. The forms of retail business included sale of snacks (i.e. chapatti), firewood, silverfish, and vegetables, especially tomatoes and amaranths. Women also provided casual labour on other people's farms in order to obtain quick cash for meeting household needs. New livelihood activities by the women included craft work (i.e. mats and basket making) and salon business. More women were also getting involved in pig production compared to the past.

Seasonal calendar

Rainfall patterns

In general across the three districts, a bimodal rainfall distribution pattern was observed with the long rainfall season occurring in April–May, whereas the short rainy season occurred in September–October (Figures 4–6). However, a few variations were observed in Mukono town and Nyendo-Ssenyange sub-county of Masaka district. The patterns of crop income, pig income and household expenditures were also mapped out since they are influenced by the rainfall calendar.

Figure 4. Rainfall pattern in Masaka district.

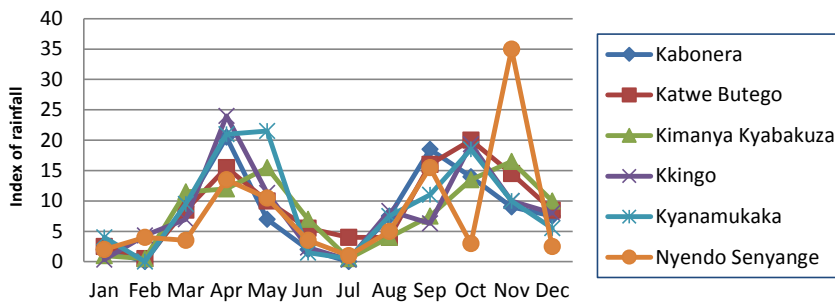


Figure 5. Rainfall pattern in Kamuli district.

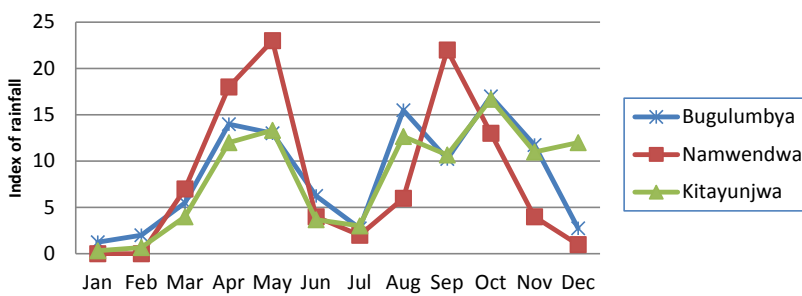
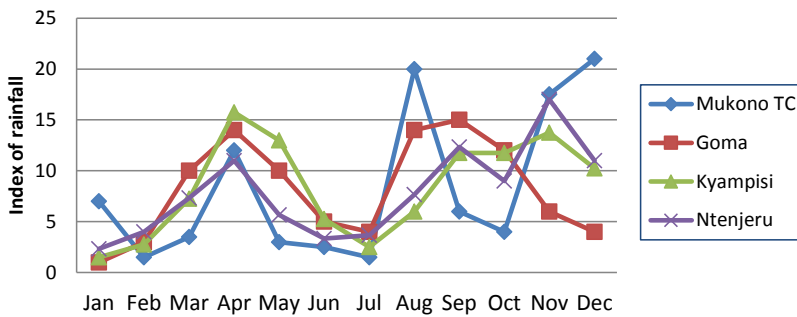


Figure 6. Rainfall pattern in Mukono district.



Agricultural income

In Masaka district, peak periods for agricultural income were in June–July and November. Coffee, which is the highest crop income earner is harvested and sold during these periods. In Kamuli district, the peak periods are in June, August and November. These peaks are attributed to coffee, maize, beans and rice income. In Mukono district, no clear pattern was observed, though in December there seemed to be a general rise in agricultural income in all the sites attributed to coffee income. Other peaks were associated with banana and maize income (Figures 7–9).

Figure 7. Pattern of agricultural income in Masaka district.

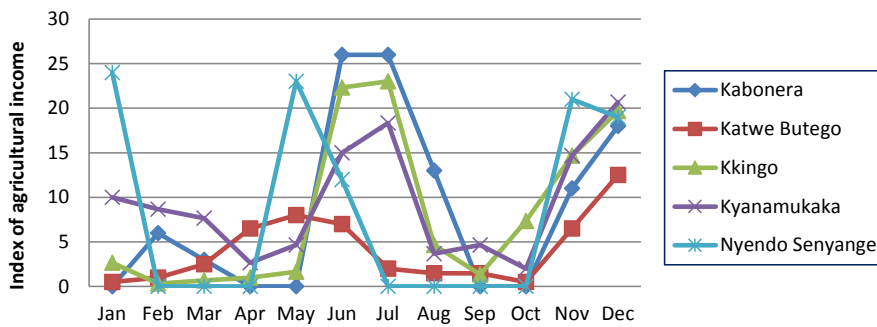


Figure 8. Pattern of agricultural income in Kamuli district.

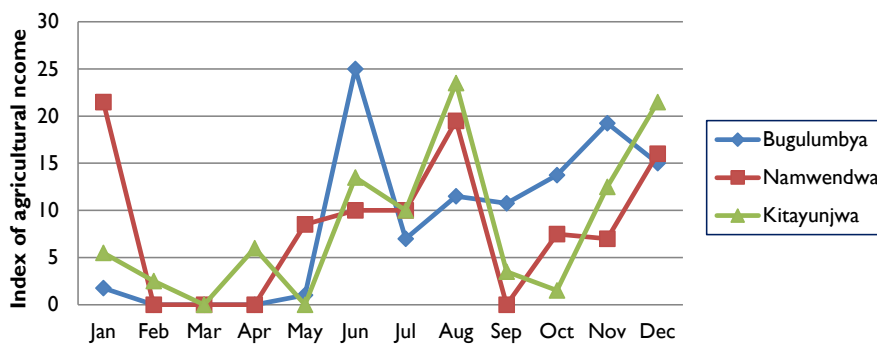
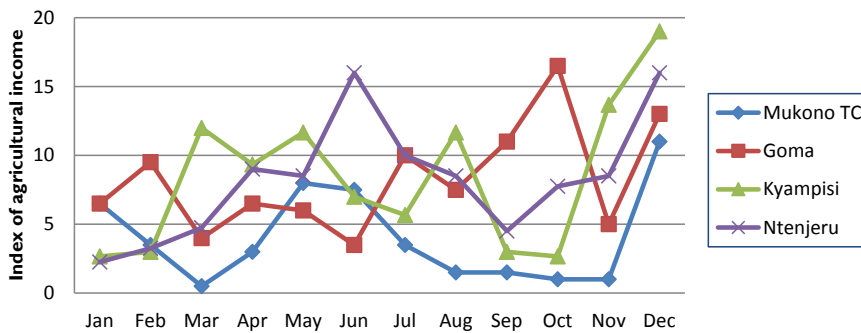


Figure 9. Pattern of agricultural income in Mukono district.



Pig income

Generally in all the sites in the three districts, peak periods for pig income were in March–April and December (Figures 10–12). In some sites, June and July also showed some relatively smaller peaks. In April and December, the pig income peaks were due to season celebrations, specifically Easter and Christmas. During that period, traders from Kampala purchase pigs from the farmers at relatively good prices. In May–June, especially in Mukono, the martyrs’ day celebrations on 3 June in the neighbouring district bring about some high pig sales. In June–July, there is localized high demand for pork due to the inflow of coffee income. During that period, farmers are not willing to accept low prices for their pigs and consequently get high returns. The farmers did not consider the periods when they sell pigs to get school fees, especially in January and August, as high pig income periods because the prices tend to be low.

Figure 10. Pattern of pig income in Masaka district.

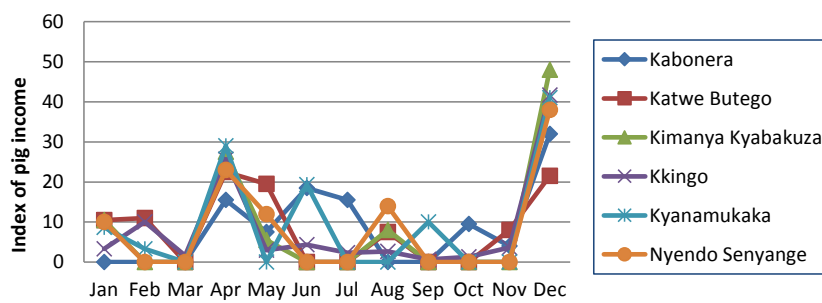


Figure 11. Pattern of pig income in Kamuli district.

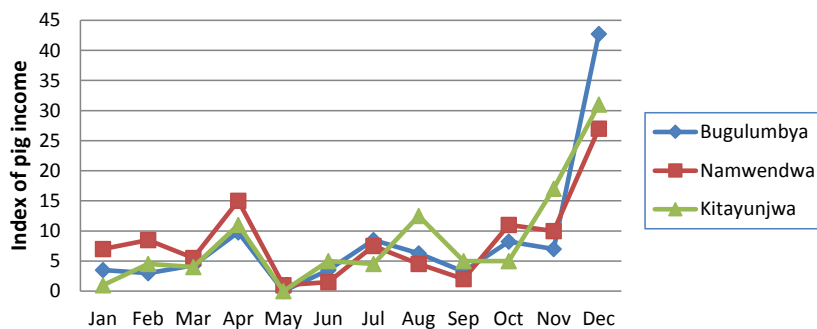
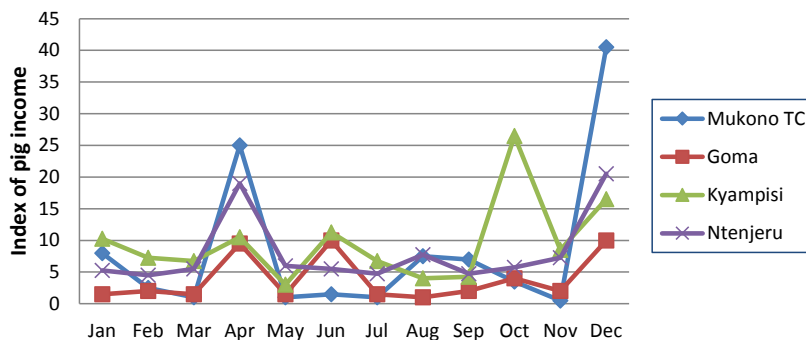


Figure 12. Pattern of pig income in Mukono district.



Household expenditures and difficult periods

There was a general trend across the sites in the three districts associated with periods of high household expenditures and difficult periods (Figures 13–17). The peaks were in February, May and August–September. These were largely associated with school fees expenditures. In December, there were also expenditures associated with Christmas season celebrations. In some sites, high expenditures on livestock feed during the dry season especially July–August was also mentioned.

Figure 13. Pattern of household expenditure in Masaka district.

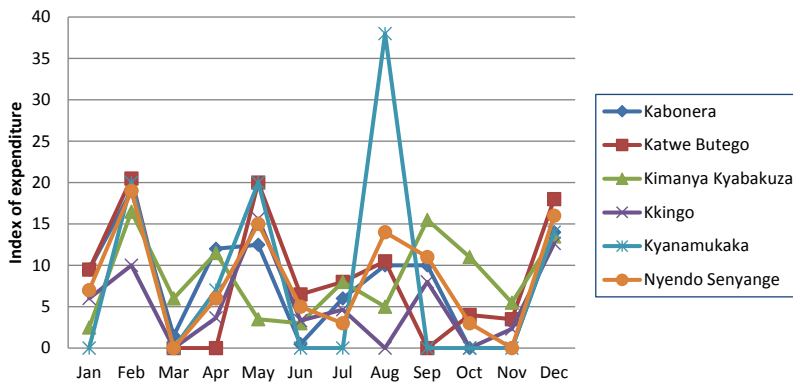


Figure 14. Pattern of household expenditure in Kamuli district.

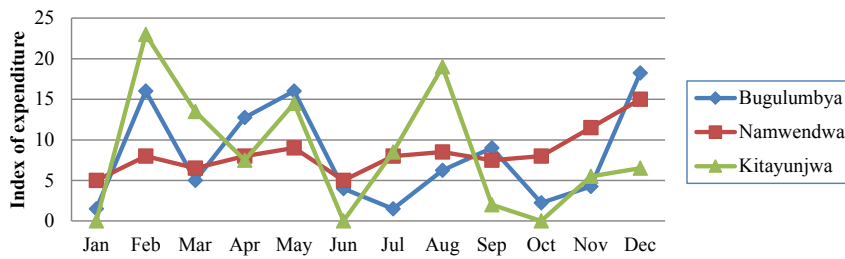


Figure 15. Pattern of household expenditure in Mukono district.

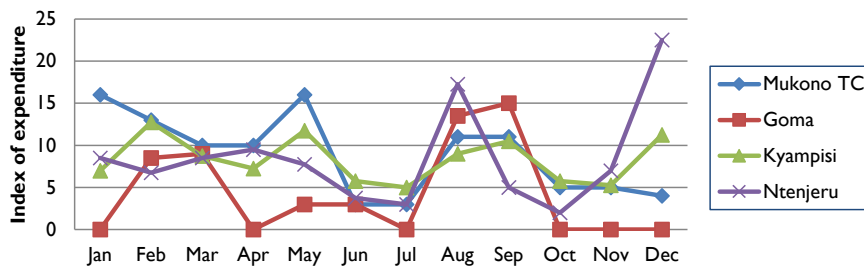


Figure 16. Difficult part of the year in Kamuli district.

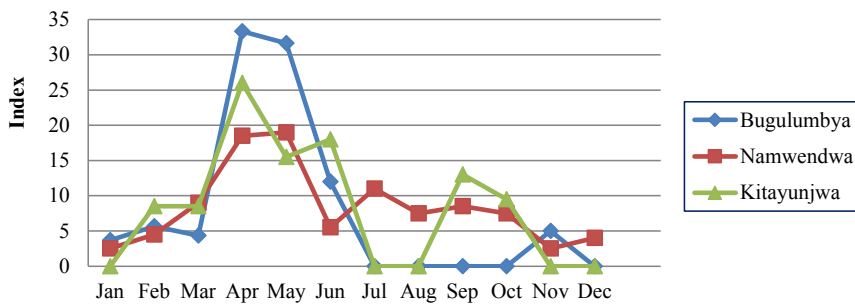
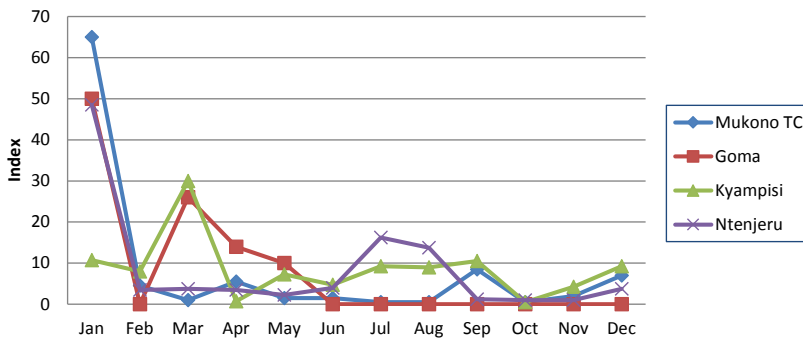


Figure 17. Difficult part of the year in Mukono district.



The farmers in Kamuli and Mukono were asked to map out the periods that they considered difficult in terms of household finances. In Kamuli district, March–June and September–October were indicated as the most difficult periods, while in Mukono it was largely January–April. These were periods for school fees and food purchase needs due to the dry season.

Gender roles

In order to assess time allocations for men and women pig farmers, different gender groups came up with their own activity clocks. Figures 18 and 19 show the activity clocks for men and women respectively.

Figure 18. General activity clock for men.

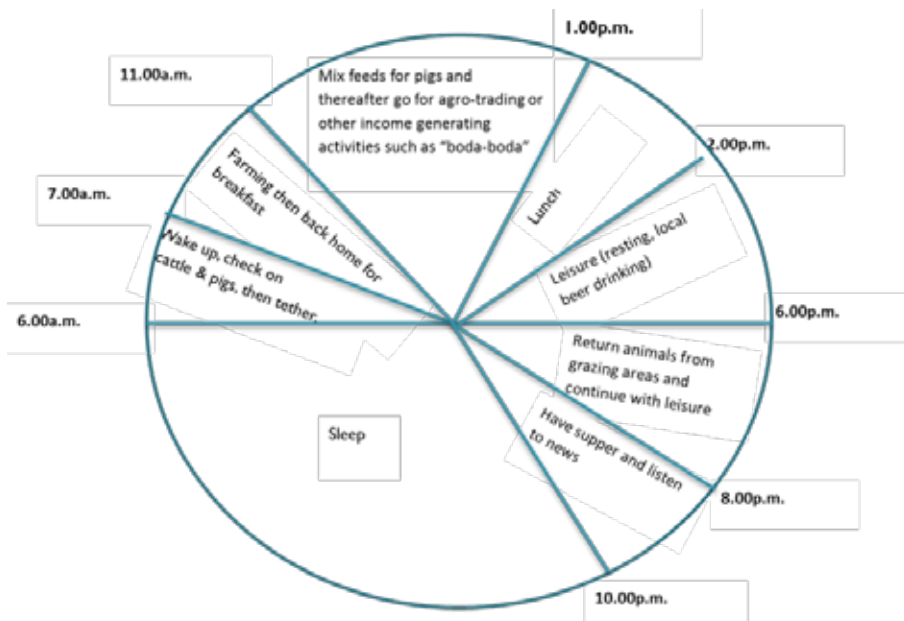
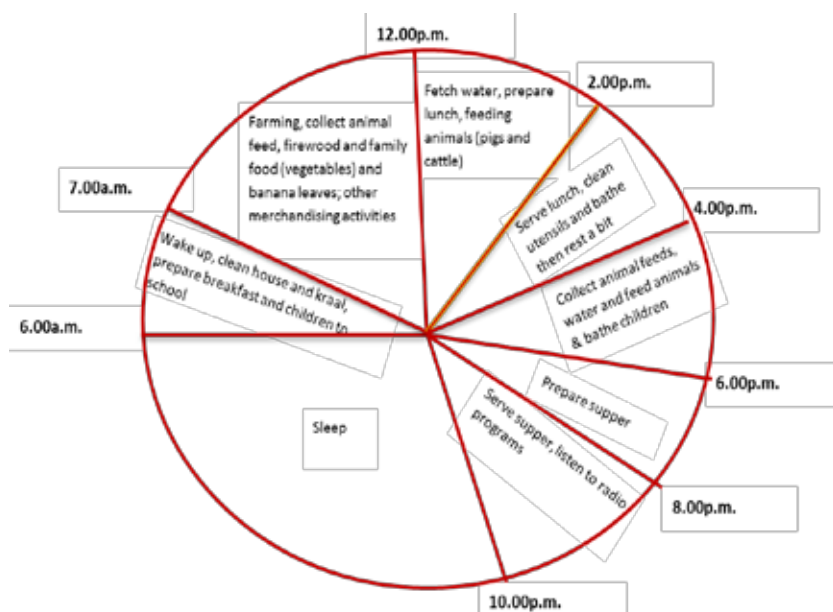


Figure 19. General activity clock for women.



The activity clock for men shows their involvement in farming especially in the morning hours, then later attending to the pig enterprise by getting involved in feed mixing. They were also engaged in non-farm income generating activities. There was a relatively high amount of leisure time at their disposal.

The activity clock for women showed their busy schedules attending to crop, pig enterprise and household chores. Their involvement in the pig enterprise included cleaning of kraals, fetching water, collecting feeds and watering and feeding the animals twice a day. The women got assistance from the children in the evening after school to assist with supper preparation. Their leisure time was generally minimal. Implications of their time resource on extension or intervention efforts—how much time do they have available to attend meetings, how far can they travel, where could be appropriate for meetings).

Decision making

In terms of men and women involvement in decision making for crop and livestock enterprises, this depended on various factors. Decision making for the crop enterprises in terms of production, marketing and income control largely depended on the objective of production. In all the separate men and women group discussions, it was evident that cash crops were controlled by men, whereas food crops were controlled by women (Table 5). Cash crops commonly grown comprised coffee and maize, while the food crops included banana, beans, cassava and sweetpotato.

Table 5. Common crops cultivated and gender of main decision-maker

Crop	No. of villages	Objective of production	Gender of main decision-maker
Banana	24	Food/Cash	Men/women
Beans	28	Food	Women
Cassava	16	Food	Women
Coffee	14	Cash	Men
Maize	25	Food/Cash	Men
Sugarcane	2	Cash	Men
Sweetpotatoes	24	Food	Women

Women were also main decision-makers for the vegetable enterprises, especially pumpkins and amaranths if done on a small scale. In Mukono and Masaka tomato and pineapple enterprises which were largely produced on a large

scale were mainly controlled by men. In terms of labour allocation to the enterprises, both men and women indicated supplying labour for production of both food and cash crops. The various tasks for the different cropping enterprises during the year are presented in Annex 5. The source of labour was largely from the family with few cases reported for hired labour supply for specific activities for the cash crops.

Pig enterprise decision-making on various activities

Separate men and women groups were asked about the main decision-makers for specific pig enterprise activities. Different responses were obtained from these groups for the same activities (Figures 20 and 21). Generally for the men group, decision making on most of the activities were indicated as either being a 'shared responsibility', thereby done jointly or some exclusively by men. For pig feeding, 11% of men indicated it as women's responsibility since they spend most of the time at home and would know how and when to feed the pig. One of the men groups interviewed gave their views using the following expression. *'The enterprise benefits the whole family. Since the man has to go out to look for money, women are left at home to take care of the pigs. On the other hand, the men know the market opportunities better since they interact widely and have to take the responsibility of marketing'*.

In most households, women take care of the pigs, while the men manage marketing.



Credit: ILRI/ Danilo Pezo.

Figure 20. Decision making on various pig enterprise activities, men only group.

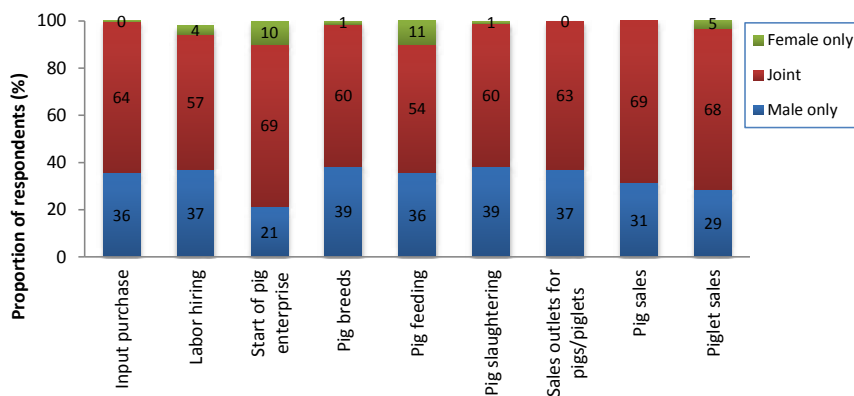
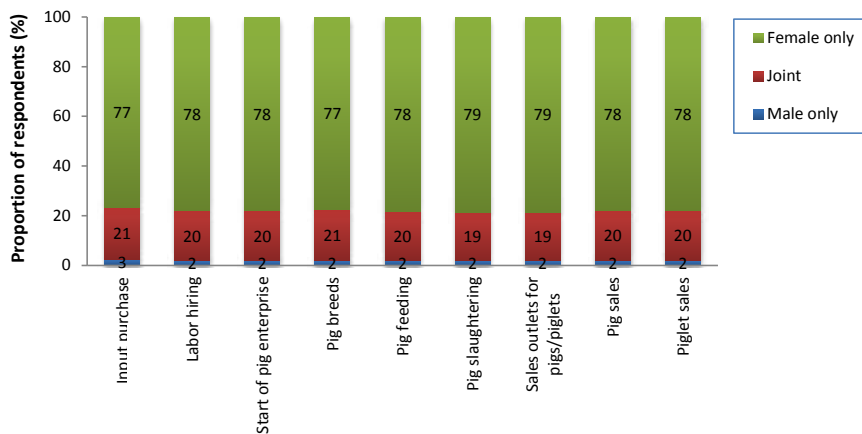


Figure 21. Decision making on various pig enterprise activities, women only group.

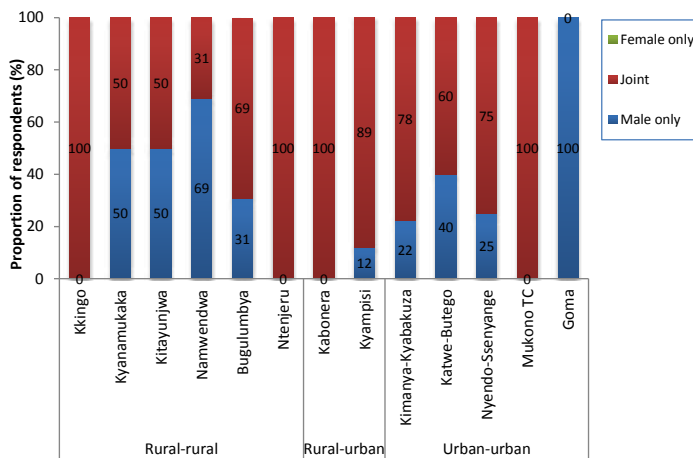


The women groups on the other hand indicated that most of the activities were done by them exclusively with a few indicating the activities as done jointly. Most women indicated the enterprise as being theirs and consequently their role to carry out activities and make most decisions.

Pig income control and decision making

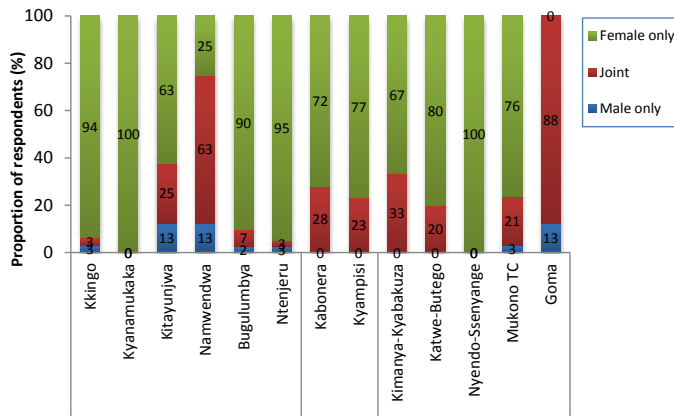
In terms of pig income control and decision making, the men groups indicated it as being a joint decision since it is a family venture though in some of the sites such as Goma and Namwendwa, they indicated it as being a man’s responsibility since he is the head of the household (Figure 22).

Figure 22. Pig income control, according to the men only groups.



The women groups on the other hand indicated decision making on pig income to be their sole responsibility, since the pig enterprise is largely a woman’s project (Figure 23). A high proportion of women, especially in Goma and Namwendwa, indicated the pig income decision to be jointly made by both men and the women.

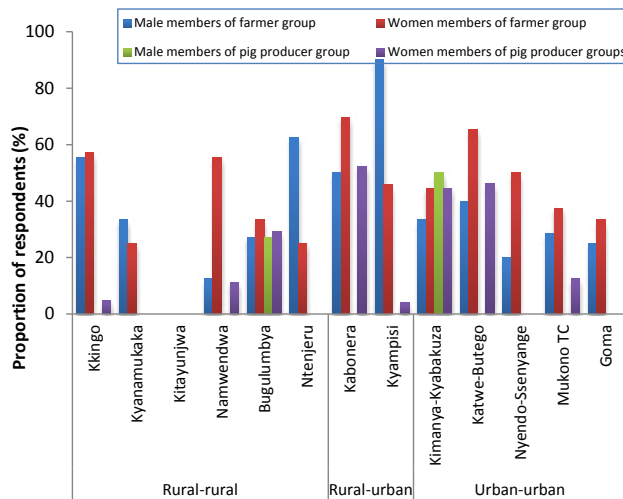
Figure 23. Pig income control, according to the women only groups.



Group membership and collective action

Farmers’ membership of groups and willingness to join such groups was used as a proxy for social capital, as it is an important avenue for accessing resources among resource-poor communities. Figure 24 shows the proportion of men and women who were members of farmer and pig producer groups. Generally in some sites, a relatively high proportion of farmers belonged to farmer groups. For instance in Ntenjeru and Kyampisi, men mostly belonged to coffee associations. Across all the sites, a relatively high proportion of women also belonged to farmer groups. In Kitayunjwa, membership of producer groups was not common, probably implying non-existence of such initiatives.

Figure 24. Membership of farmer and pig producer groups.



Some of the farmers were members of pig producer groups, especially those in the rural–urban and urban–urban value chains. Although in some rural–rural value chains, especially in Bugulumbya, a number of pig producers belonged to such groups, which were largely supported by VEDCO. In Kabonera, there was a large pig farmers group. In Katwe-Butego, there was a largely women dominated pig farmers group known as Akwata Empola women’s group registered with the District Community Development Office. In Kyampisi, there was Buwanguzi Buntaba Farmers group, which diversified into many activities, including cattle, pigs, goat and poultry production, in addition to providing catering services. Although pig producer groups existed in some few areas, they were absent in others or needed strengthening in areas where they existed.

Most farmers who did not belong to the pig producer groups expressed interest in joining with preconditions of a clear constitution to regulate the group activities, in addition to a trustworthy leadership. Their interest in joining

such groups included improved access to markets, inputs and services and in the acquisition of skills on improved pig production and management.

Institutions and institutional interactions

The pig farmers were asked to reflect on the institutions operating within their villages and assess them in terms of importance and their contribution to the communities' welfare. A number of institutions were mentioned, some of which address pig value-chain issues. In the urban–urban and rural–rural value chains of Masaka district, NAADS was highly ranked in terms of importance⁶ (Table 6). The farmers indicated its important contribution in offering advisory services on modern agricultural practices and livestock management, especially supporting farmer groups and helping them in the acquisition of inputs and piglets, and advice on proper housing structures. In some cases, NAADS supplied some of the house construction materials while the farmers supplied labour.

Institutional mapping session



Credit: ILRI/Emily Ouma.

Venn diagram for institutional assessment



Credit: ILRI/Emily Ouma.

Table 6. Highly ranked institutions in terms of importance

Value-chain domain type		
Urban–urban	Rural–urban	Rural–rural
Masaka district	Masaka district	Masaka district
(i) Katwe-Butego: NAADS	(i) Kabonera: BRAC, FINCA and World Vision	(i) Kyanamukaka: World Vision and NAADS
(ii) Kimanya-Kyabakuzi: NAADS and BRAC		(ii) Kkingo: CO-SAVE and World Vision
(iii) Nyendo-Ssenyange: NAADS		
Mukono district	Mukono district	Mukono district
(i) Goma: AMCALL and NAADS	(i) Kyampisi: FHU, NAADS and Tujja SACCO	(i) Ntenjeru: Katosi Women's Trust
(ii) Mukono town: BRAC and Biyinzika Development Group		
		Kamuli district
		(i) Bugulumbya: NAADS and VEDCO
		(ii) Namwendwa: UNAFI and BRAC
		(iii) Kitayunjwa: NAADS

BRAC, which is a microfinance institution offering group loans to women and individual loans to men at a low interest rate, was also highly ranked in some of the sites. In some cases, institutions that support vulnerable groups, such as

6. NAADS is the National Agricultural and Advisory Services. BRAC is a Micro Finance Institution in Uganda working with vulnerable groups.

orphans through school fees payment, purchase of scholastic materials while also providing families with livestock such as goats and pigs for free, were also highly ranked especially in the rural–urban and rural–rural value chains. Such institutions included World Vision and FHU. Katosi Women’s Trust ranked highly in Ntenjeru. It is an NGO with the aim of improving the general living standards of poor, rural peasant communities of Ntenjeru and Nakisunga sub-counties in Mukono district through the empowerment of women. It evolved out of the success of Katosi Women Fishing and Development Association and currently networks 11 women groups. Some of the Venn diagrams indicating the importance of the institutions and levels of interaction with the communities are depicted in Annex 6.

In Kamuli district, VEDCO, a local NGO ranked highly in Bugulumbya where it offers training to farmer groups on improved livestock and agricultural practices. It provides piglets and feed inputs, while also offering training on the construction of pig housing. It is also involved in hygiene and sanitation interventions. NAADS was also ranked as important in the same sub-county and it supplies improved seeds and planting materials especially for maize, beans, banana and cassava.

Pig production systems

Objectives of pig keeping

The main objectives of pig keeping were ranked by the respondents, separately for men and women. There was no significant difference in mean rankings of objectives by men and women. The highest ranked objective was income from sale of piglets and grown pigs followed by manure production (Table 7). The two objectives were indicated by a high proportion of both male and female farmers relative to the rest. Other objectives indicated by some farmers included nutrition/food security and source of wealth.

Table 7. Objectives of pig keeping

Objectives	Mean rank (all)	Masaka (% of respondents)		Kamuli (% of respondents)		Mukono (% of respondents)		
		Men	Women	Men	Women	Men	Women	
Income from piglet/pigs sales	1.3(0.6)	1.2(0.6)	31	36	34	32	26	29
Income from pig meat sales	2.0(1.4)	N/A	0	0	2	2	1	0
Source of wealth	2.3 (0.8)	2.3(0.9)	13	8	7	7	12	15
Manure production	2.3(0.6)	2.3(0.5)	30	34	31	31	30	34
Disposal of waste	3.0 (1.0)	3.0(1.0)	2	1	0	0	0	0
Nutrition/food security	2.5(0.6)	2.8(0.4)	13	14	29	29	18	17
Occupation	2.3(0.9)	2.6(0.5)	11	7	0	0	13	5

Note: The lower the rank the higher the value (standard deviation in parenthesis)

The farmers were then asked for indicators of success in meeting these objectives. These are summarized in Table 8.

Table 8. Success indicators in achieving pig production objectives

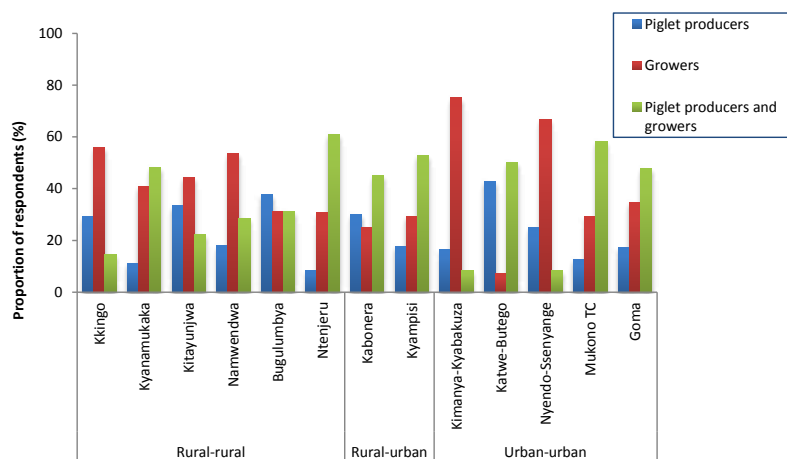
Objective	Indicators of success
Income from piglet/pigs sales	Ability to pay school fees. Bought land and expanded the farm. Ability to pay off debts. Able to meet medication costs, buy good clothing for family.
Source of asset/wealth	Construction of better family housing (roofing/wall material). Purchase of plots of land. Purchase other livestock (cattle). General home development.
Manure production	Improved soil fertility—high crop yield due to manure application. Harvest bigger bunches of ‘matooke’.
Nutrition/food security	Biogas for household use. Meat for home consumption. Increased quantity of pork consumption.
Others	Good time management

A very common indicator of success in achieving the income objective was the ability to meet school fees obligations. Pig keeping also played an important role in improving the welfare of the households by enabling them to expand the farm, purchase other livestock and improve the family housing unit. It is important to note the role of pig manure in soil fertility management. Most farmers indicated improved soil fertility and others were able to use biogas for lighting and cooking.

Pig production types

Figure 25 shows the pig production types in which the farmers were engaged. Piglet producers are involved in piglet sales only, while growers are those that buy or rear piglets, fatten and sell grown pigs for slaughter. In general there were high proportions of growers only and both piglet producers and growers compared to piglet producers only. However, in some sites such as Katwe–Butego the proportions of piglet producers were significantly higher than the growers.

Figure 25. Pig production types, by value-chain domain.



Scale of production

The farmers were asked to provide an indication of the different production scale levels for both piglet producers and growers and indicate the proportion of households in their village belonging to each production scale. Table 9 shows the production scale for piglet producers, defined in terms of number of sows owned, including the replacement females. On average, small-scale piglet producers were defined by the farmers as those owning one–three sows, while the medium and large scale were defined as those owning three–six sows and more than six sows respectively. This was the general trend across all the value-chain domains. In the rural–rural value-chain domain, 50–82% of the households were small-scale piglet producers, while 18–30% and 5–15% were medium and large scale, respectively. In the rural–urban value chain, 50–60% of the households were smallholders, while 25–30% and 8–12% were medium and large holders, respectively. In the urban–urban value chain, majority were smallholders, 57–80% of the households while 15–35% were medium holders and 5–10% large holders.

Table 9. Production scale based on number of sows (including replacement females)—piglet producers

Value-chain domain	Sub-county	Small scale			Medium scale			Large scale		
		Min	Max	%	Min	Max	%	Min	Max	%
Rural–rural	Kkingo	1.0	3.0	82	4.0	6.0	18	7.0	–	0
	Kyanamukaka	1.0	1.3	52	2.3	3.7	35	4.7	10.0	5
	Kitayunjwa	1.3	2.3	59	3.8	5.8	25	6.5	11.5	14
	Namwendwa	1.0	2.0	52	3.0	4.3	27	5.5	7.0	14
	Bugulumbya	1.3	2.5	46	3.4	4.6	30	5.5	8.6	16
	Ntenjeru	1.0	1.8	56	2.8	3.8	30	4.9	43.5	14
Rural–urban	Kabonera	1.3	2.7	62	3.7	5.0	29	6.0	10.0	8
	Kyampisi	1.6	3.1	54	2.1	3.3	25	4.0	6.3	12
Urban–urban	Kimanya-Kyabakuza	1.0	2.0	82	3.0	4.5	15	5.0	–	4
	Katwe-Butego	1.0	2.0	63	3.0	4.0	32	5.0	–	5
	Nyendo-Ssenyange	1.0	1.5	66	2.5	3.0	25	3.5	–	10
	Mukono town	1.0	2.5	57	3.5	5.0	35	6.8	11.7	9
	Goma	1.0	1.8	58	2.8	4.0	26	4.7	6.0	16

Table 10 shows the production scale for growers. On average, the farmers defined small-scale growers as those owning 1–4 grown pigs for slaughter, while the medium and large holders owned 4–11 and more than 11 grown pigs for slaughter, respectively. In the rural–rural value-chain domain, 40–60% of the households were smallholders, while 25–38% and 15–20% were medium and large holders, respectively. In the rural–urban value chain 60–64% of the respondents were smallholders, while 20–25% and 10–15% were medium and large holders, respectively. In the urban–urban value chain, smallholder growers comprised 50–80% of the households while medium and large holder comprised 12–30% and 5–20% of the households.

Table 10. Production scale based on number of pigs produced for slaughtering—growers

Value-chain domain	Sub-county	Small-scale			Medium-scale			Large-scale		
		Min	Max	%	Min	Max	%	Min	Max	%
Rural–rural	Kkingo	2.3	3.7	58	4.3	7.0	25	11.3	25.0	17
	Kyanamukaka	1.0	2.0	60	3.0	4.3	28	5.3	–	12
	Kitayunjwa	2.0	4.3	41	4.3	7.0	38	8.8	18.3	21
	Namwendwa	1.0	2.5	53	3.8	5.0	25	6.3	8.0	17
	Bugulumba	1.8	3.5	54	4.3	6.5	26	6.9	9.4	12
	Ntenjeru	1.1	2.6	53	3.5	4.8	26	5.6	56.5	15
Rural–urban	Kabonera	1.7	4.3	64	5.3	7.7	25	9.3	18.3	11
	Kyampisi	1.5	2.8	61	4.6	10.5	23	14.9	39.6	15
Urban–urban	Kimanya-Kyabakuza	1.0	3.0	81	4.0	6.0	12	6.0	–	6
	Katwe-Butego	1.0	2.5	73	3.5	5.0	20	5.5	–	7
		1.0	2.0	54	3.0	4.0	35	5.0	–	11
	Nyendo-Ssenyange									
	Mukono town	2.5	5.0	51	5.0	11.5	31	11.8	33.3	18
Goma	1.0	2.0	64	3.2	6.0	16	10.3	12.3	20	

Between 50 and 82% of the households were small-scale piglet producers, owning one to three sows.



Credit: ILRI/Emily Ouma.

Value-chain mapping

Market outlets for grown pigs

Four main market outlets were used by farmers for selling grown pigs (Figures 26 and 27 for men and women, respectively). Generally, the common outlet for both men and women pig farmers was neighbourhood butchers. In some sites such as Namwendwa, this was the only outlet utilized. Direct sales to consumers, especially for home slaughter during special occasions was relatively common in some sites by men pig farmers, especially in Ntenjeru and a few sites in the rural–urban and urban–urban value chains.

Figure 26. Marketing channels for grown pigs, men only.

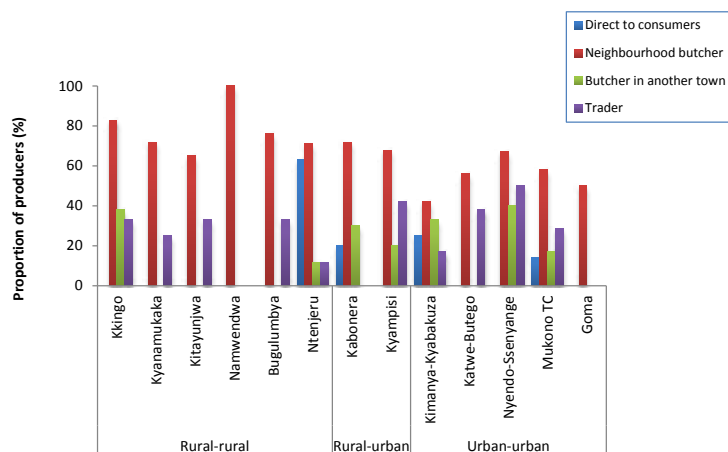
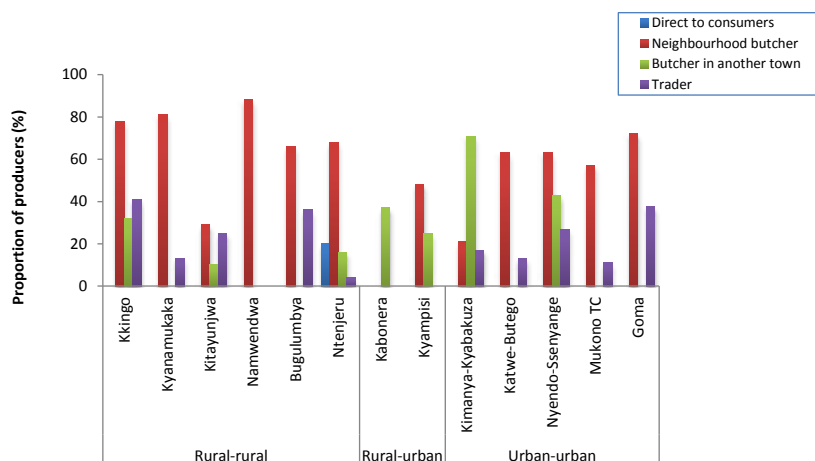


Figure 27. Marketing channels for grown pigs, women only.



The rural–rural value-chain domains, especially those located in Kamuli district (Kitayunjwa, Namwendwa and Bugulumbya) seemed to have fewer alternative market outlets for marketing grown pigs compared to Masaka and Mukono districts.

Sales to butchers in other nearby towns were common in the urban–urban value chains, especially in Masaka district. The main target town was Saza in Katwe-Butego sub-county of Masaka municipality where the demand for pork is high and it has the highest number of pork joints in Masaka municipality.

Most women pig farmers in Kimanya-Kyabakuza (75%) and Kabonera (40%) sub-counties were selling to butchers in nearby towns (Figure 27). Most of the women in these sub-counties were linked to microfinance institutions, such as BRAC, through groups such as Kwerimidde and Akaguba farmer groups. Therefore, sales to the main market, Saza in Katwe-Butego, gave them a sure market for their pigs in order to pay off their loan obligations.

The farmers were asked for availability of buyers of grown pigs from different outlets (Table I I). This gives a reflection of the market outlets actually used by the pig producers.

Table 11. Availability of buyers of grown pigs

Value-chain domain	Sub-county	Average no. available buyers	Butcher in another town	Neighbourhood butcher	Traders
Rural–rural	Kkingo	34	26	56	18
	Kyanamukaka	16	0	75	25
	Kitayunjwa	11	9	55	36
	Namwendwa	2	0	100	0
	Bugulumbya	41	0	85	15
	Ntenjeru	51	31	47	22
Rural–urban	Kabonera	45	22	66	22
	Kyampisi	40	25	70	5
Urban–urban	Kimanya-Kyabakuza	23	48	35	17
	Katwe-Butego	51	0	94	6
	Nyendo-Ssenyange	61	29	65	6
	Mukono town	46	43	52	4
	Goma	35	0	94	6

Generally, there were more buyers in the urban–urban and rural–urban value-chain domains, with Nyendo Ssenyange in Masaka district having the highest number of buyers. The rural–rural value chains, especially those in Kamuli district had the least number of buyers except for Bugulumbya sub-county where VEDCO is involved in promoting the pig value chain. Of the available buyers, the neighbourhood butchers were most common in all value-chain domains (apart from Kimanya-Kyabakuza) and traders the least in the urban–urban value chains though relatively common in the rural–rural value chain.

Market outlets for piglets

The marketing channel for piglets in all the sub-counties was relatively short, with farmers selling to other farmers within their village or neighbouring villages. However, the large holders and commercial-oriented farmers mainly marketed their piglets through institutions such as NAADS and NGOs.

Producer prices

Grown pigs

Producer prices for grown pigs from different sales outlets are presented in Table 12. In the rural–rural value-chain domain, the highest producer price was offered by the butcher in another town and the least by the neighbourhood butchers, where they commonly sold their animals. Price offers by traders in the rural–urban and urban–urban value chains were relatively high compared to the rural–rural value-chain domain. In the rural–urban and urban–urban value chains, the prices by the neighbourhood butcher and butcher in another town were comparable.

Most producers sell to the neighbourhood butchers albeit at low prices.



Credit: ILRI/Danilo Pezo.

Table 12. Producer prices in Ugandan shilling (UGX)⁷ per kg live-weight for the different market outlets for grown pigs

Value-chain domain	Sales outlets							
	Butcher in other town		Direct to consumers		Neighbourhood butcher		Traders	
	Average price	S.D.	Average price	S.D.	Average price	S.D.	Average price	S.D.
Rural–rural	5129	1463	4667	1885	3633	1195	4903	628
Rural–urban	4283	400	–	–	4829	1921	5742	955
Urban–urban	5200	889	5750	1061	5144	1289	5996	343

Note: Average live-weight = 40kgs.

Piglets

The producer prices for piglets are presented in Table 13. In the rural–rural domain, the average price per head ranged between UGX 20,000 and 27,000, though Ntenjeru, in Mukono district had the highest piglet prices in the rural–rural value chain of UGX 32,500, possibly due to relative proximity to Mukono town and Kampala.

Table 13. Producer prices (UGX/head) for piglets

Value-chain domain	Sub-county	Average price	S.D.	No. of farmers selling
Rural–rural	Kkingo	20000	12247	29
	Kyanamukaka	26667	2887	20
	Kitayunjwa	25000	7071	13
	Namwendwa	25000	3536	16
	Bugulumbya	24000	6519	37
	Ntenjeru	32500	2673	48
Rural–urban	Kabonera	32500	5000	20
	Kyampisi	34000	5477	18
Urban–urban	Kimanya-Kyabakuza	36667	5774	10
	Katwe-Butego	30000	–	13
	Nyendo-Ssenyange	43333	11547	18
	Mukono town	50000	–	8
	Goma	40000	–	10

7. On 15 April 2015, 1 USD = Ugandan shilling (UGX) 2999.85.

In the rural–urban and urban–urban value chains, where most pig farmers kept improved breeds, the piglet prices ranged from UGX 30,000 to 50,000.

Price differentials

Summaries of producer price differentials across a typical year and the associated reasons are presented in Table 14.

Table 14. High and low price offers by month

High price offers	Low price offers
Mukono district	Mukono district
June: Celebration of martyrs' day in Namugongo.	Jan–Feb, May–Aug: High supply of pigs in the market, to pay school fees, depresses market prices.
April and December: Festive seasons (Easter and Christmas).	
July: Mortality losses are usually high due to ASF. This pushes the prices up as there are fewer pigs offered in the market.	
Masaka district	Masaka district
July and Aug: This is the season when coffee farmers get income from their produce. Therefore the demand for pork is high. The pig farmers are not willing to accept low prices since they also have crop income.	Jan and Aug: High supply of pigs in the market, to pay school fees, depresses market prices.
Kamuli district	Kamuli district
July–Oct: During this period agricultural products have been harvested and are an important source of income. Therefore pig farmers cannot accept low prices as they have alternative income sources.	Jan–March: High supply of pigs in the market, to pay school fees, depresses market prices. It is also the period just after Christmas festivities and producers are willing to accept any price in order to obtain some income.
April and Dec: Festive seasons (Easter and Christmas).	

Inputs and services

Pig farmers access extension services through government, development agencies and private practitioners.



Credit: ILRI /Emily Ouma.

Extension services

The common sources of extension services mentioned by the pig farmers were NAADS, NGOs (VEDCO and World Vision), other farmers (sharing of information) and AHSP (Table 15). The AHSP also provide advisory services especially on animal husbandry practices.

Table 15. Access to extension services

Value-chain domain	Sub-county	Source of extension services (% of respondents)							
		NAADS		NGO		Other farmers		AHSP	
		Men	Women	Men	Women	Men	Women	Men	Women
Rural–rural	Kkingo	13	21	0	0	0	0	0	0
	Kyanamukaka	50	11	0	0	38	21	0	0
	Kitayunjwa	0	0	0	0	0	0	0	0
	Namwendwa	0	0	0	0	0	0	20	0
	Bugulumbya	14	4	19	12	0	0	0	0
	Ntenjeru	10	10	0	0	6	0	0	0
Rural–urban	Kabonera	20	5	15	13	0	0	0	0
	Kyampisi	12	5	12	38	18	10	15	5
Urban–urban	Kimanya-Kyabakuza	25	15	0	0	25	50	0	0
	Katwe-Butego	33	43	33	57	67	43	0	0
	Nyendo-Ssenyange	40	25	0	0	0	0	40	21
	Mukono town	7	28	0	11	0	0	0	0
	Goma	33	25	0	0	25	13	50	38

Generally a higher proportion of men received extension services compared to women, except in Katwe-Butego, Kkingo and Kyampisi. NAADS was a common source of extension service provider among the urban–urban value-chain farmers of Masaka and Mukono districts without a large differential in the proportion of men and women farmers receiving the service. However, in the rural–rural value chains, NAADS was not very prominent, except in Kyanamukaka where 50% of the men had access compared to only 11% of the women.

In the rural–rural value chains of Kamuli district (Namwendwa, Kitayunjwa), few farmers had access to any source of extension. This was even worse for women since none of them received any extension service, though a few of their male counterparts especially in Namwendwa at least received extension from the AHSP. In Bugulumbya sub-county, VEDCO, a local NGO provided extension services in some of the parishes where it operates. In Katwe-Butego, World Vision also provided extension services, especially targeting the vulnerable. Extension service diffusion through other farmers was also common across the sites.

Access to credit

Generally across the value chains, few pig farmers, either men and women indicated having access to credit, though they need it. Some farmers in the rural–urban and urban–urban value chains obtained credit from formal sources (banks and MFIs). In Kimanya-Kyabakuza, women farmers had access to credit through BRAC, a microfinance institution operating in the region (Table 16). Informal sources such as SACCOs, village and women groups were important avenues for obtaining financial credit for the farmers.

Table 16. Access to credit

Value-chain domain	Sub-county	Source of credit (% of respondents)								
		SACCO		MFI		Banks		Village groups		Women groups
		Men	Women	Men	Women	Men	Women	Men	Women	Women
Rural-rural	Kkingo	25	14	0	0	0	0	0	0	0
	Kyanamukaka	0	0	0	0	0	0	0	0	16
	Kitayunjwa	0	0	0	0	0	0	0	0	0
	Namwendwa	0	0	0	0	0	0	0	0	0
	Bugulumbya	21	20	0	0	0	0	0	0	0
	Ntenjeru	0	0	0	0	0	0	6	5	0
Rural-urban	Kabonera	0	5	0	5	0	0	0	0	0
	Kyampisi	9	7	13	5	12	5	9	12	0
Urban-urban	Kimanya-Kyabakuza	0	0	8	13	25	30	0	0	0
	Katwe-Butego	17	14	0	0	0	0	0	0	0
	Nyendo-Ssenyange	40	0	0	7	0	0	0	0	29
	Mukono town	0	0	14	44	0	0	0	0	0
	Goma	17	0	0	4	0	0	0	0	0

Animal health services

Animal health service providers comprise veterinarians, para-veterinarians and NAADS staff providing animal health services. The services include animal disease diagnosis, and treatment and prevention measures. Generally a higher proportion of men received animal health services compared to women, except in Kimanya-Kyabakuza and Katwe-Butego where a higher proportion of women received the services from government animal health service providers (Table 17). In the two sub-counties there are women groups involved in pig production with NAADS providing support services.

Table 17. Access to animal health services

Value-chain domain	Sub-county	Source (% of respondents)			
		AHSP-government		AHSP-private	
		Men	Women	Men	Women
Rural-rural	Kkingo	25	5	25	21
	Kyanamukaka	28	24	13	11
	Kitayunjwa	0	0	33	30
	Namwendwa	20	0	50	38
	Bugulumbya	29	24	0	0
	Ntenjeru	6	8	21	18
Rural-urban	Kabonera	30	0	15	16
	Kyampisi	6	7	22	20
Urban-urban	Kimanya-Kyabakuza	25	30	25	18
	Katwe-Butego	25	43	50	29
	Nyendo-Ssenyange	0	0	60	14
	Mukono town	0	11	18	22
	Goma	33	0	42	50

Pig live-weight measurement in Kamuli. Both private and public animal health service providers operate in the pig producer sites.



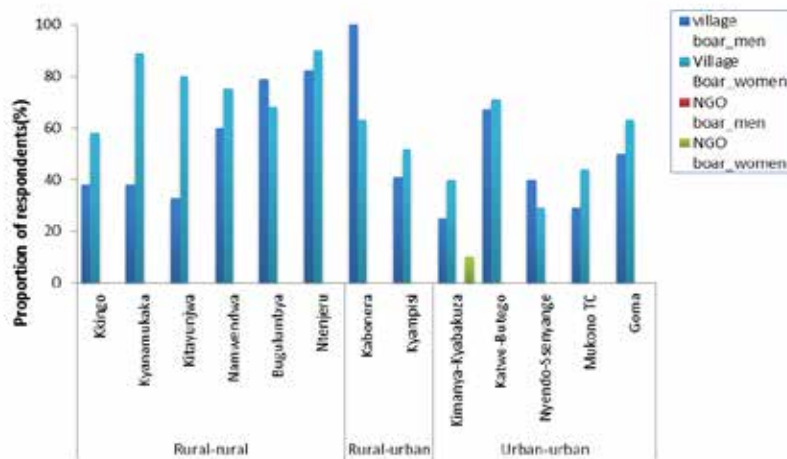
Credit: ILRI/Danilo Pezo.

In some of the urban–urban value chains, a high proportion of farmers, especially men accessed animal health services from private animal health service providers. Namwendwa, which belongs to a rural–rural value chain had a high proportion of farmers (50% men and 30% women) accessing the services from a private provider.

Breeding services

Most of the farmers in all the sites obtained breeding services for their pigs from boars owned by other farmers within their villages (Figure 28). In Kimanya–Kyabakuzi a few women obtained breeding services from a boar provided by an NGO.

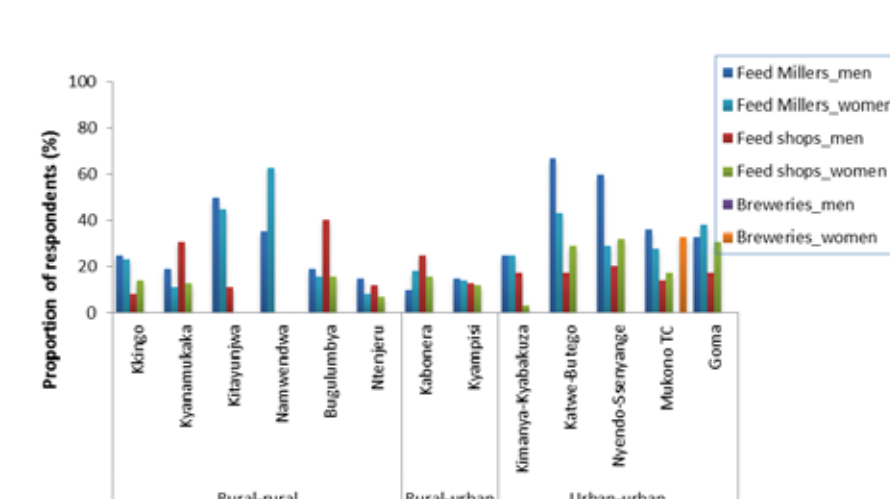
Figure 28. Source of breeding services.



Feeds

Most of the pig farmers sourced their feeds from feed millers—mainly from maize millers in order to obtain maize bran. Feed shops were also a relatively common source of feeds for pigs, especially for men in Kyanamukaka and Bugulumbya sub-counties, though a high proportion of women in the urban–urban domains also obtained their feeds from the shops (Figure 29). A few women in Mukono town obtained brewer’s waste for their pigs from the breweries in Jinja.

Figure 29. Source of feeds.



Input prices

The prices of selected inputs are presented in Table 18. The price of all inputs apart from breeding was relatively higher in the rural–rural value chains. This was largely due to associated transaction costs of marketing the inputs in the rural areas. The price of mixed feed rations ranged from UGX 900–1111 per kg. These were mixed feed rations comprising maize bran and a protein source from either sunflower, cotton seed cake or a fish meal. Payment for breeding services was mainly in the form of a piglet or cash equivalent of the same.

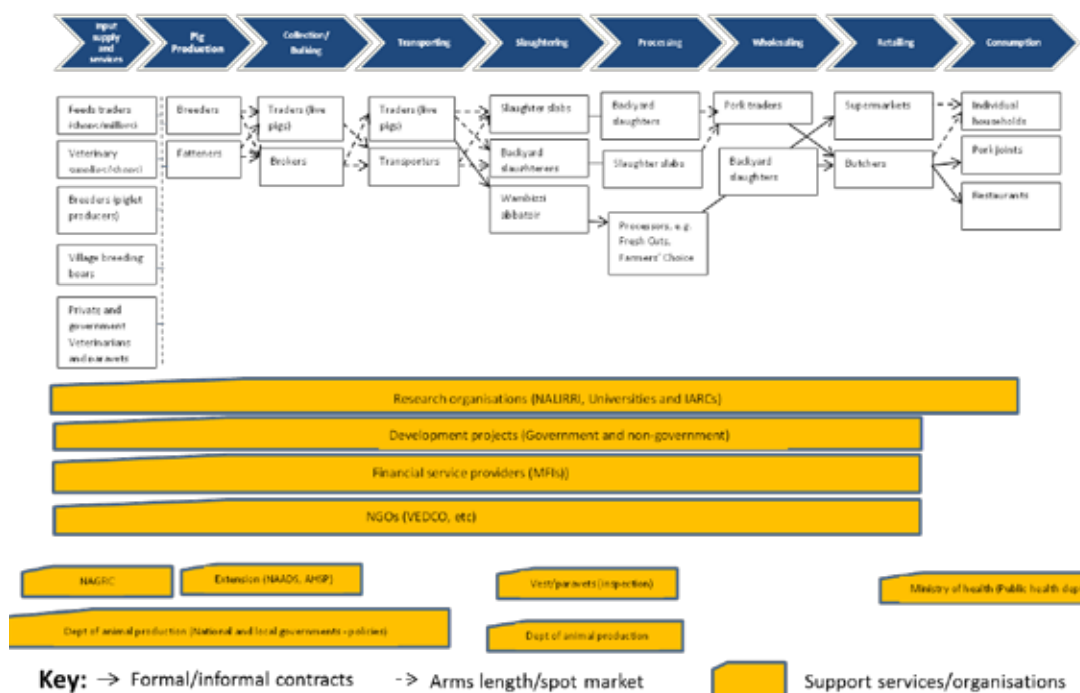
Table 18. Prices of common inputs in UGX

Item	Unit	Rural–Rural		Rural–Urban		Urban–urban	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Dewormer	Tablet	1000	500	–		910	111
Multi-vitamin	Injection	1500	500	1500	354	2214	699
Breeding	Service	22143	6993	18571	4756	30833	12303
Maize bran	Kg	368	103	400	100	383	90
Mixed feeds	Kg	1111	455	1150	495	898	267

Pig value-chain map

Based on the information provided by pig farmers as regards the actors along the value chain, a generic value-chain map is presented in Figure 30. Specific value-chain maps for different sites can also be found in Annex 7. Market information services are largely lacking in the pig value-chain maps as the farmers have no access to such service providers.

Figure 30. Pig value-chain map.



Coordination in the value chain is mainly arm's length or spot market in nature with few actors engaged in some form of formal or informal contractual arrangements. Several organizations such as research, development projects and line ministries of the central government play limited supporting roles.

Feeds and feeding

Feeding is one of the main constraints in smallholder pig production systems, due to seasonal variability in availability and quality of feeds. In instances when commercial feeds are used as the basal diet or as supplements, farmers often do not have information on the nutrient requirements of their animals. More so, feed manufacturers formulate rations based on feed resources they can obtain at a relative low cost.

In most pig production systems, the cost of feeds represents 60 to 80% of the total cost of production, however in many smallholder farms, it is difficult to estimate the real cost because animals are fed on crop residues, household leftovers and forages for which pig producers do not have an estimate of their cost.

To understand the feeding strategies applied by smallholder farmers in the three districts, this study carried out focus group discussions in 35 villages covering aspects such as type of feeding system practiced, provision of water, variation in feed availability, use of different feed resources throughout the year, role of forages in the feeding systems and the main constraints in feeding pigs, as well as potential solutions from perspectives of smallholder farmers.

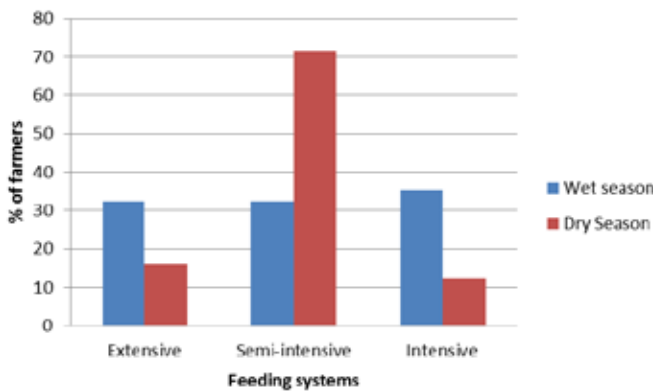
Feeding systems

The feeding systems practiced by smallholder farmers were classified as:

- Extensive: animals are allowed to scavenge or are kept tethered. The latter is mostly practiced during the cropping season to prevent animals from damaging the crops. When animals are tethered, farmers provide some feed and water.
- Semi-intensive: animals scavenge or are tethered during part of the day, but the rest of the day are confined, with or without supplementary feeding and water provision.
- Intensive: animals are kept in corrals all the time; feed and water are provided by the farmers.

For instance, in case of Kamuli district where the value-chain domains were largely classified as rural–rural, farmers practice extensive, semi-intensive or intensive feeding systems during the wet season. However, during the dry season most farmers (70%) practice semi-intensive feeding system, showing a shift from intensive or extensive systems (Figure 31). VEDCO has been promoting rearing of pigs in pens and hence majority of farms where intensive feeding systems are practiced are in those villages covered by VEDCO.

Figure 31. Feeding systems practiced in Kamuli during the wet and dry seasons.



Analysing feeding systems by value-chain domain type showed that intensive and semi-intensive systems were commonly practiced in the urban–urban and rural–urban value-chain domain sub-counties, respectively, regardless of the season (Figures 32 and 33).

Figure 32. Feeding systems practiced during the wet season by value-chain domain and sub-county.

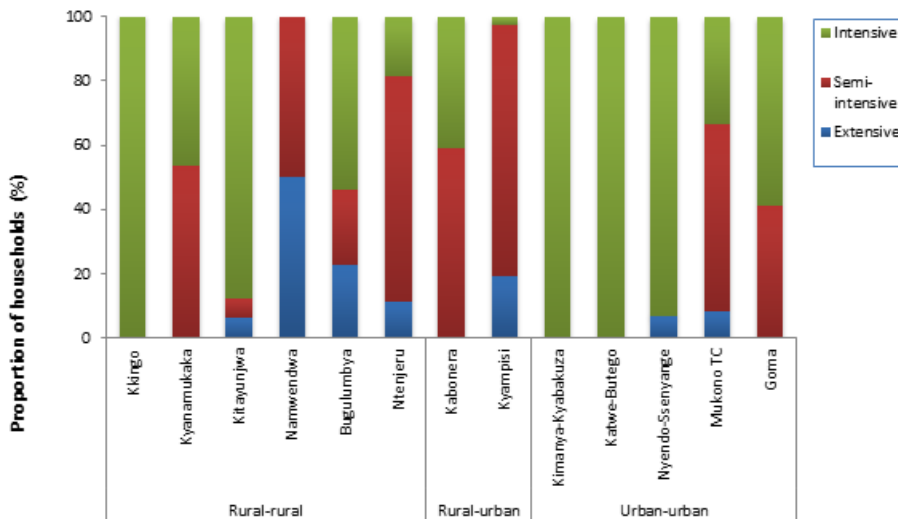
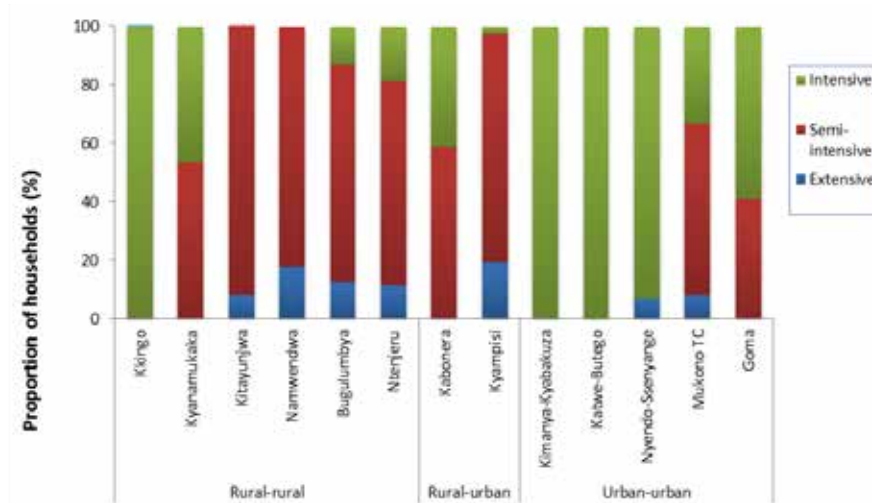


Figure 33. Feeding systems practiced during the dry season by value-chain domain and sub-county.



Extensive feeding systems were common in the rural–rural domains during the wet season (Figure 32), but switched to semi-intensive during the dry season (Figure 33). The only exception was observed in Kkingo sub-county of Masaka district where, in spite of belonging to the rural–rural value-chain domain, farmers practiced intensive systems in both the wet and dry seasons. This could have been as a result of advice provided by technical staff of the district veterinary office and NAADS. Other exceptions were Bugulumbya (Kamuli district) where several farmers change from semi-intensive to intensive feeding systems during the wet season, and Namwendwa (Kamuli) where a high proportion of farmers changed from extensive systems during the wet season to semi-intensive during the dry season (Figures 32 and 33).

Some differences were observed in feeding systems practiced for different categories of pigs. For example, in the case of Kamuli district, piglets were mainly managed in extensive feeding systems regardless of the season whereas growers and finishers were mostly managed in extensive or semi-intensive feeding systems during the wet season (Figures 34–36).

Figure 34. Feeding systems practiced in Kamuli, as a function of category of animals.

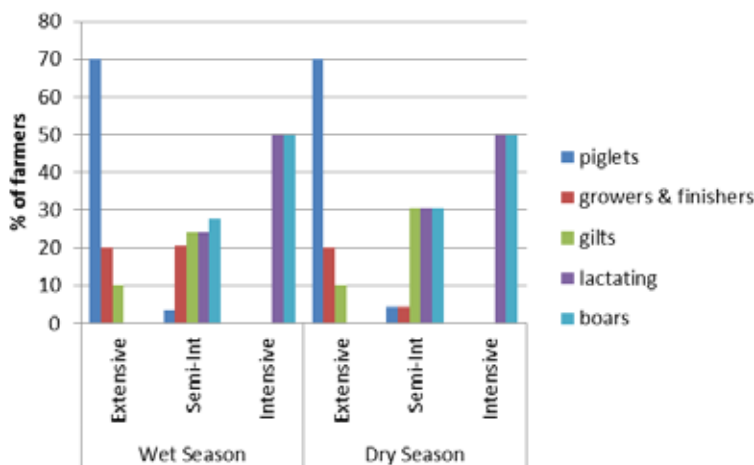


Figure 35. Feeding systems practiced in Masaka, as a function of category of animals.

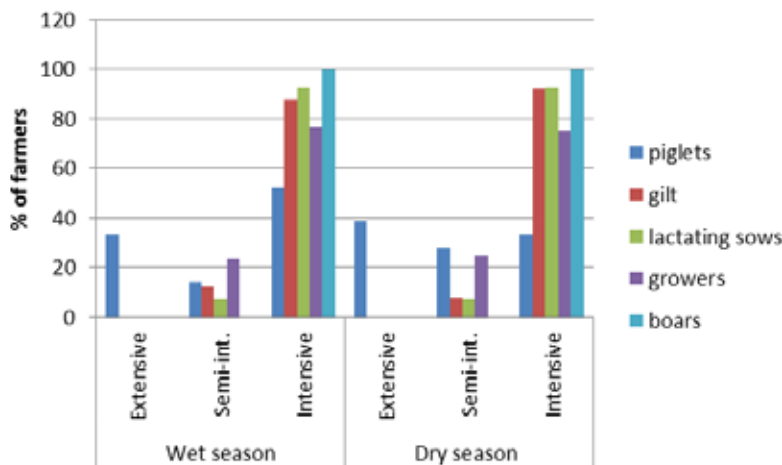
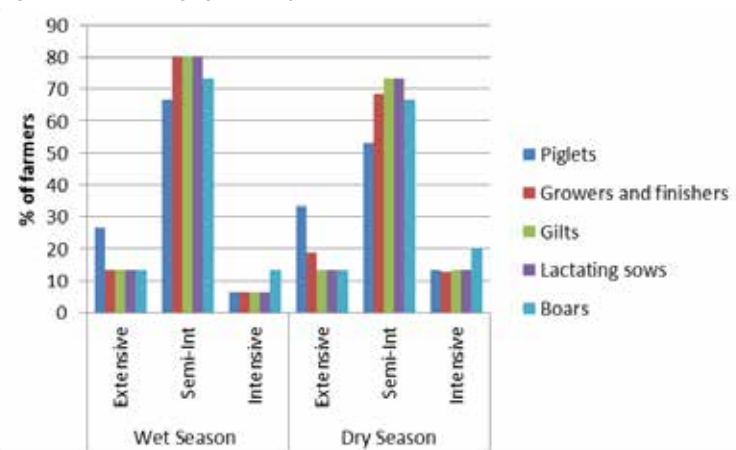


Figure 36. Feeding systems practiced in Mukono, as a function of category of animals.



In Masaka, the extensive system was less practiced and in the few instances where it was done, it was mainly applied to piglets but within close proximity to the lactating sow, due to their dependence on milk. For the other pig categories, intensive feeding systems were dominant. In contrast, in Mukono, the semi-intensive feeding systems tended to be dominant for all categories.

Water provision

Water availability was considered a limiting factor not only for livestock production but also for other family needs in most smallholder pig farming households particularly in rural areas. Family members, mostly women and children, devote time to fetch water for household use, in addition to that for consumption by animals. In some households, there were efforts to collect and store rainwater. The common sources of drinking water for livestock include boreholes and wells, rainwater, springs, residual water after other uses (waste water), and tap water. The latter is common only in the urban/peri-urban areas. Some farmers in the rural areas even reported giving urine to the animals as a source of water. The relative importance of the different water sources varied with seasons and value-chain domains (Figures 37 and 38).

Figure 37. Percentage of households with different sources of water during the dry season, by value-chain domain type.

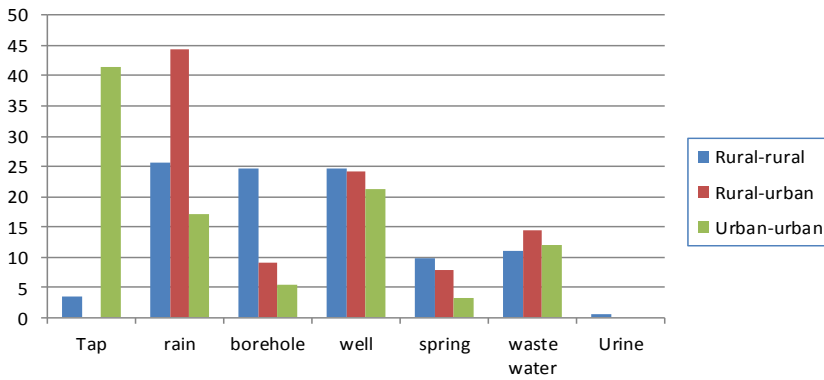
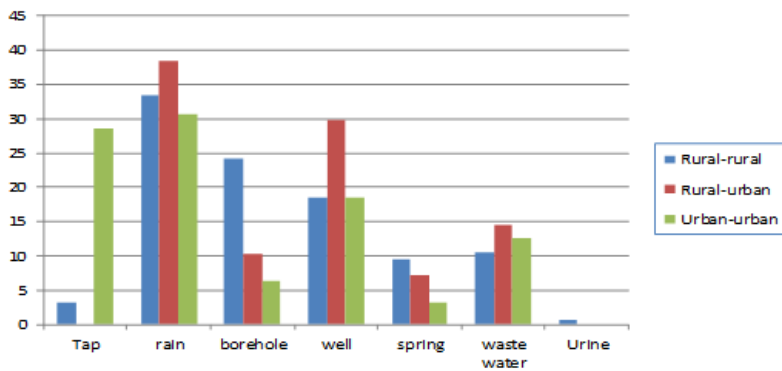


Figure 38. Percentage of households with different sources of water during the wet season, by value-chain domain type.



For instance, tap water and rainwater were the main sources of water for pigs in the urban/peri-urban value chains but the former is more frequently used during the dry season, while the latter is most used during the wet season when collection and storage of rainwater is more feasible. In the rural value-chain domains, bore holes and wells were the main sources of water during the dry season when rainwater was scarce (Figure 36). Waste water was also commonly used for watering pigs in both dry and wet seasons.

Use of tap water, particularly during the dry season, was more common in sub-counties that belonged to the urban–urban value-chain domain (Figure 37), whereas some farmers switched to use of rainwater during the wet season (Figure 38). In some sub-counties belonging to the rural–rural value-chain domain (e.g. Kkingo, Kyanamukaka, Bugulumbya), use of rainwater replaced either boreholes or wells during the wet season (Figures 39 and 40).

Figure 39. Sources of drinking water for pigs during the dry season, by value-chain domain and sub-county.

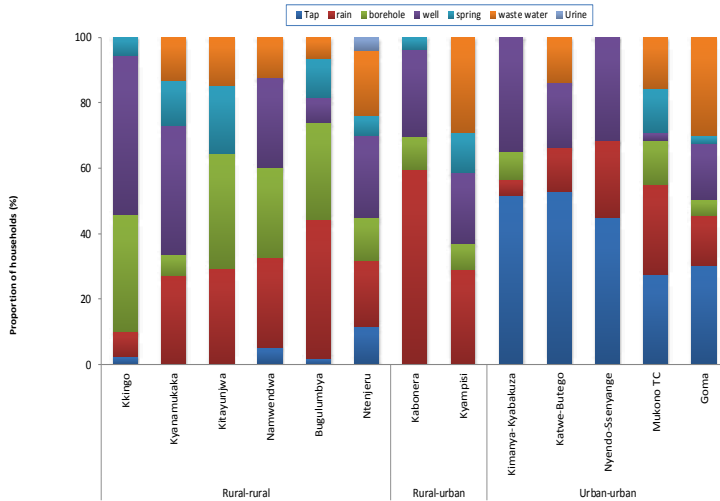
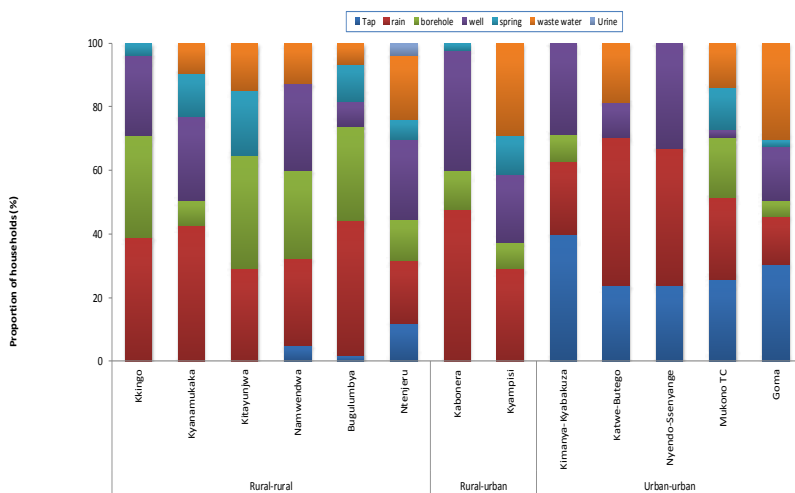


Figure 40. Sources of drinking water for pigs during the wet season, by value-chain domain and sub-county.



The frequency of water provision for pigs during the day varied among farms and value-chains settings. The majority of farmers (30–60%), regardless of the value-chain domain and district, tended to give water to the pigs twice a day (Figures 41–43). The frequency of watering the animals depended on access to water by the households. For instance, in the rural value chains where the main water sources were boreholes or wells, water was offered to pigs only once a day. However, in the rural–rural value-chain domain of Masaka district, a number of farmers mentioned they offered water to pigs throughout the day. At times, they would offer water once but in large amounts that would suffice the whole day.

Figure 41. Pig watering frequency in Masaka district, by value-chain domain type.

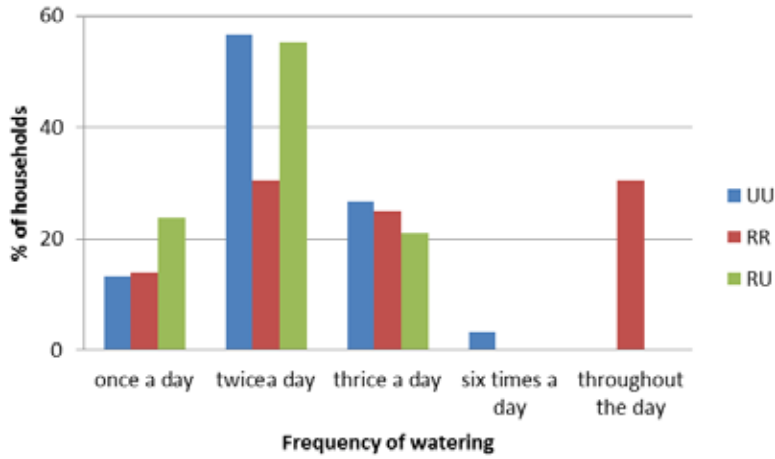


Figure 42. Pig watering frequency in Mukono district, by value-chain domain type.

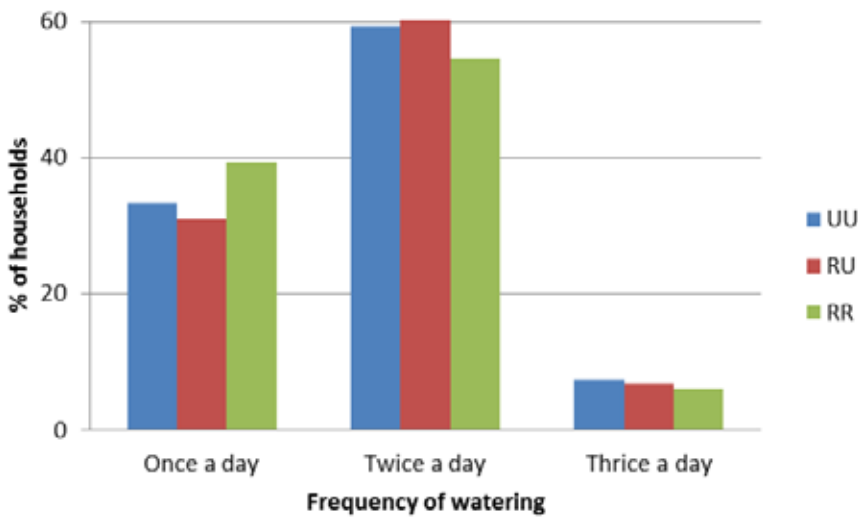
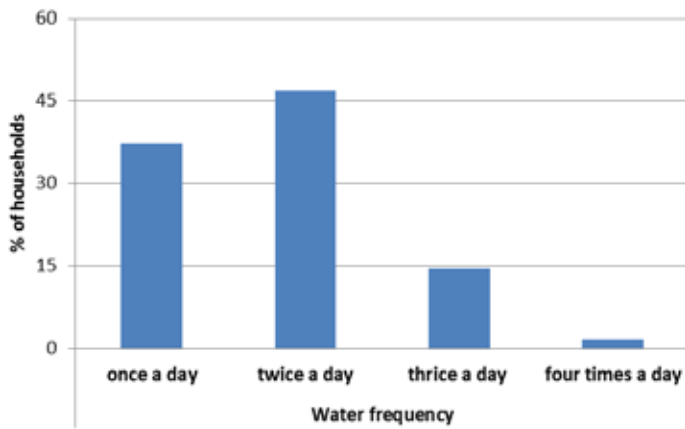


Figure 43. Pig watering frequency in Kamuli district, by value-chain domain type.



Feed types

Availability of feeds

Crop residues were found to be important components of pig diets in the three districts and hence availability of feeds was higher in the months when crops were harvested. Key informants interviewed in Kamuli district (Kitayunjwa and Bugulumbya sub-counties) revealed that whenever long droughts occurred, the failed crops became key sources of feed to pigs (Annex 8.10). In Kamuli district where pig production is largely in the rural value-chain domain, there was higher availability of feeds for pigs in those months when crops are harvested (January, April, May, July and August); whereas, in the last months of the year (October to December) the availability of feeds declined (Figure 44). A similar pattern was observed in the rural-rural value-chain domain in Masaka district (Figure 45). However, in Mukono district, a different pattern was observed even in the rural setting (Figure 46). The explanation for that behaviour could not be clearly established since there wasn't much difference in rainfall and cropping patterns compared to the other two.

Figure 44. Relative availability of feeds in smallholder pig farms in Kamuli, as a % per month.

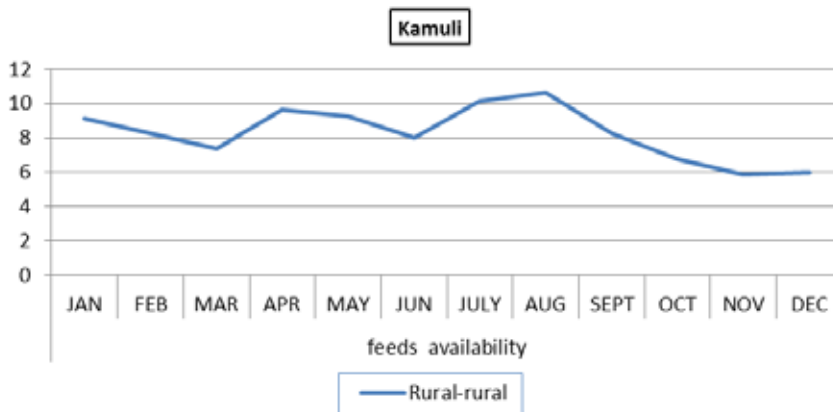


Figure 45. Relative availability of feeds in smallholder pig farms in Masaka, as a % per month.

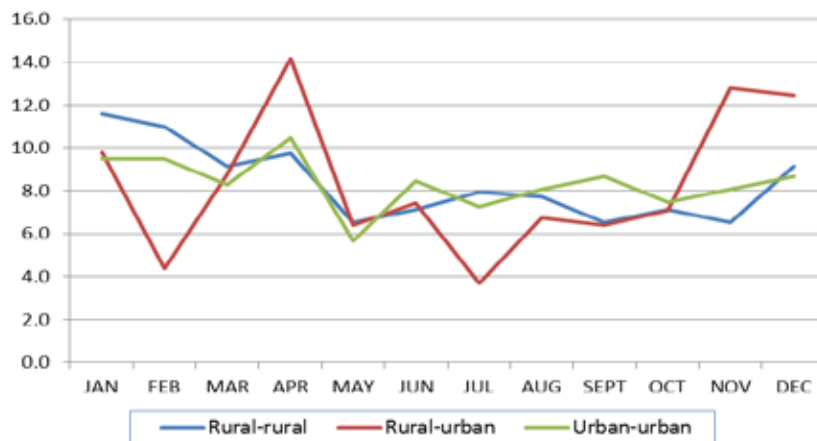
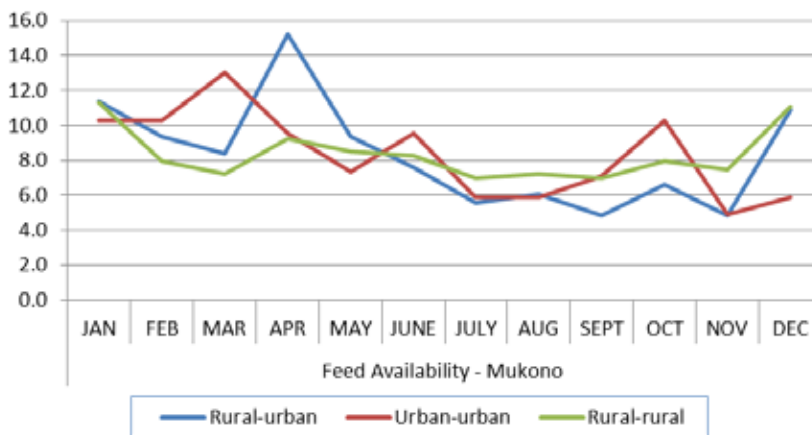


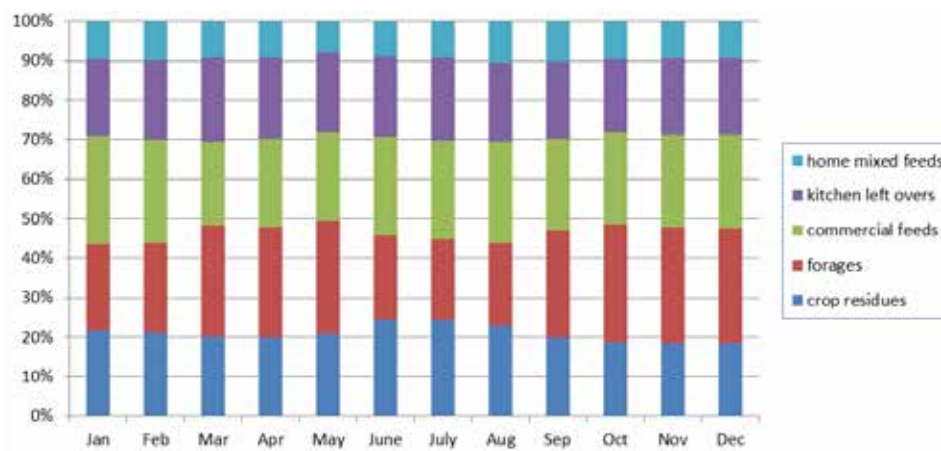
Figure 46. Relative availability of feeds in smallholder pig farms in Mukono, as a % per month.



Types of feeds offered

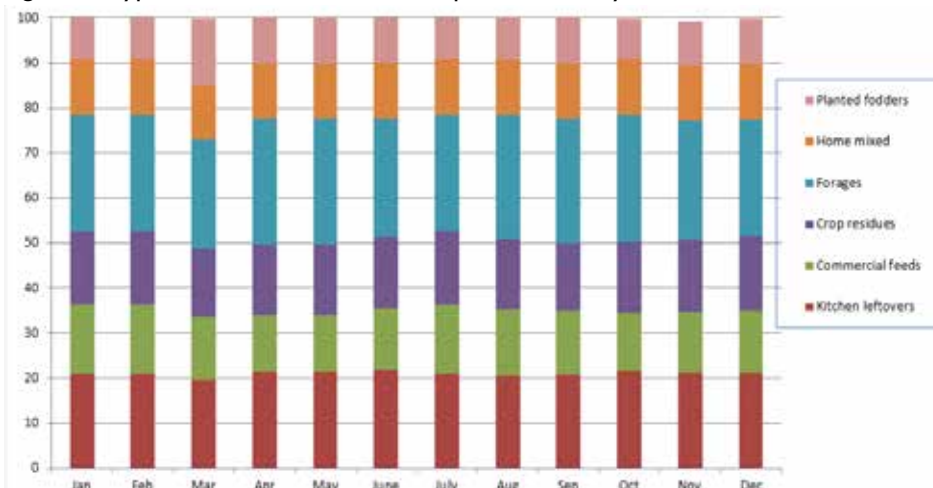
Some differences in the relative importance of different types of feeds and their use along the year were observed while comparing the three districts. Masaka had the highest proportion of commercial concentrates in the diets ranging from 25% to 30%, though its use was less between March and May when forage use in diets was highest (Figure 47). Kitchen leftovers and crop residues were also important components of diets in Masaka and the relative contribution of the former is almost constant throughout the year, whereas the latter made a greater contribution in the dry period (June and August). Home mixed feeds represent no more than 10% of the diet.

Figure 47. Types of feeds used in different periods of the year in Masaka district.



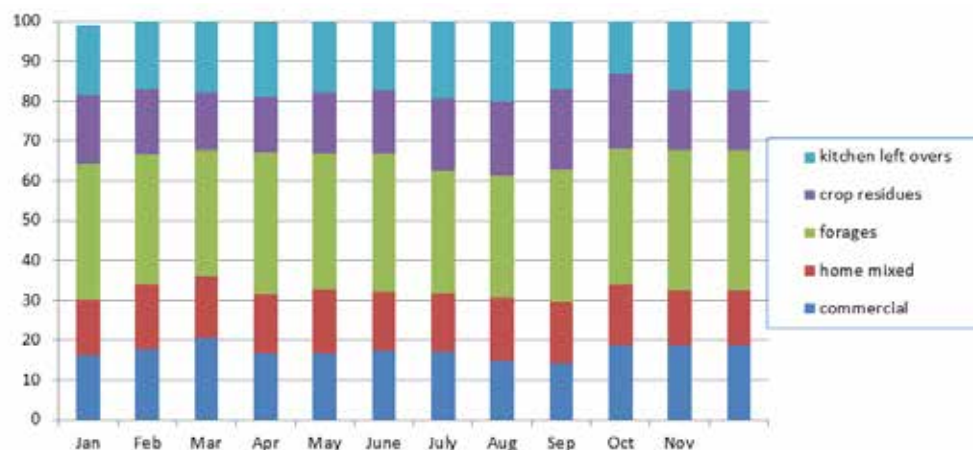
In Mukono, the contribution of the different feeds showed a slight variation along the year (Figure 48). Forages (natural or planted) and kitchen leftovers were the main components in the diet. Crop residues and commercial concentrates were less prominent than in Masaka but the contribution of home mixed concentrates to the diet was similar (about 10%). On average, the contribution of compound feeds (commercial and home-mixed) was about 20% yet in Masaka, it ranged from 30% to 35%.

Figure 48. Types of feeds used in different periods of the year in Mukono district.



In Kamuli, forages and concentrates were the main components of the diet constituting 30% and 35% respectively, and the rest (about 30%) constituted kitchen leftovers and crop residues (Figure 49). In months when the availability of crop residues declined (March–June and November–December), kitchen leftovers were more prominent. The relative contribution of home mixed and commercial concentrates in the diet was similar to what was observed in Mukono though in Masaka, the pattern differed in that commercial concentrates were more prominent.

Figure 49. Types of feeds used in different periods of the year in Kamuli district.



There were no major differences among the value-chain domains in Masaka in terms of the relative contribution of crop residues in the pig diets as well as other feed types (Figures 50 to 51). An exception is the case of the kitchen leftovers, which were consistently less important in the rural-rural value chains. However, in all cases, banana peelings are consistently the most important component among the household kitchen leftovers, which corresponds to the high consumption of 'matoke' in the households of Masaka district. Similar trends were observed in the other two districts (Mukono and Kamuli), therefore graphs are not included in this report.

Figure 50. Relative contribution (%) of crop residues to pig diets in Masaka, by value-chain domain type.

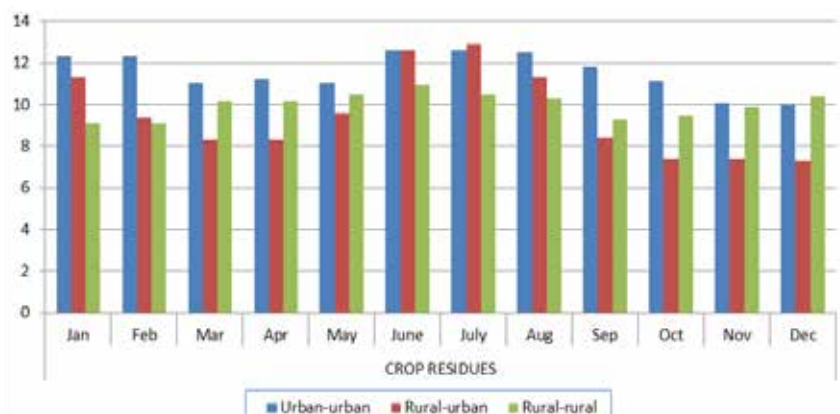
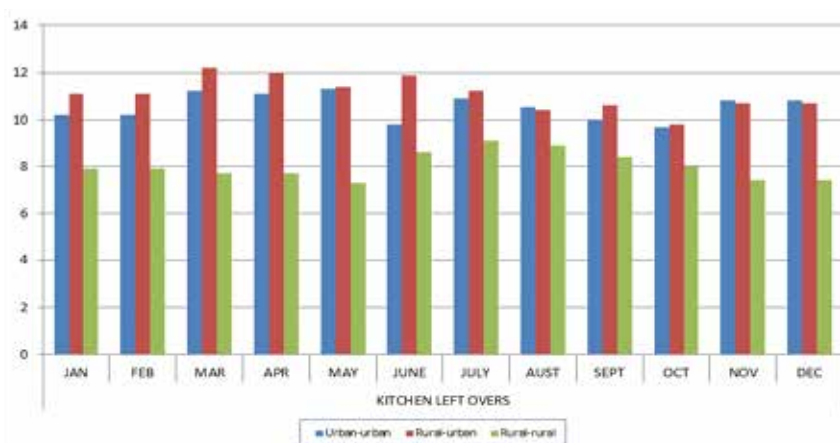


Figure 51. Relative contribution (%) of kitchen leftovers to pig diets in Masaka, by value-chain domain type.



Several crop residues, forages as well as fruits, were used by farmers to feed pigs. Among the crop residues and forages preferred by smallholder pig farmers were: sweetpotato vines, cassava leaves, yam leaves, Amaranthus and an herbaceous plant identified as pig weed (wandering jew). The relative preference of different crop residues and forages by farmers from the different value-chain domains and sub-counties are presented in Tables 19 and 20 respectively.

Table 19. Relative preference of different forage sources by pig farmer, based on value-chain domains

	Sweetpotato vines	Cassava leaves	Yam leaves	Amaranth spp.	Wandering jew	Others
R-R	5.0	3.2	2.6	1.1	1.0	0.2
R-U	5.0	3.6	3.1	1.0	0.7	0.2
U-U	5.0	1.4	2.7	0.5	2.0	1.5

Note: 5—Most preferred 0.1—least preferred

Table 20. Relative preference of different forage sources by pig farmer

Value chain domain	Subcounty	Sweetpotato vines	Cassava leaves	Yam leaves	Amaranths	Wandering Jew	Others
R-R	Kkingo	5.0	1.8	1.4	0.0	0.9	0.5
	Kyanamukaka	5.0	3.7	2.7	1.2	0.0	0.0
	Kitayunjwa	5.0	2.9	1.6	0.0	3.5	0.0
	Namwendwa	4.6	3.0	3.6	3.2	0.0	0.0
	Bugulumbya	5.0	3.7	3.3	0.4	1.6	0.0
	Ntenjeru	5.0	3.5	2.5	2.0	0.5	0.5
R-U	Kabonera	5.0	3.0	3.3	1.0	1.7	0.0
	Kyampisi	5.0	4.0	3.0	1.0	0.0	0.4
	Kimanya-Kyabakuza	5.0	0.0	2.1	1.6	1.4	1.9
	Katwe-Butego	5.0	1.9	1.4	0.9	2.1	1.6
U-U	Nyendo-Ssenyange	5.0	0.0	2.8	0.0	3.6	2.6
	Mukono town	5.0	3.7	3.3	0.0	2.0	1.0
	Goma	5.0	1.9	4.0	0.0	0.0	0.0

Note: 5—Most preferred 0.1—least preferred

Regardless of the value chain domain and subcounty, the most preferred forage source is sweetpotato vines. The second most preferred forage source is cassava leaves in the rural-rural and rural-urban domains, whereas in the case of the urban-urban value chain domain yam leaves are the second most preferred. Local genotypes of Amaranth spp. and a weed called Wandering Jew are also relevant for pig feeding in the three value chain domains.

Preferences for certain forage resources differed in some subcounties. For instance, cassava leaves were relatively less preferred in Kkingo, Kimanya-Kyabakuza, Nyendo-Ssenyange, and Katwe-Butego (Table 20) owing to concerns regarding potential toxicity. On the other hand, the local Amaranth species was highly preferred in Namwendwa in Kamuli district, where VEDCO has been promoting it as a high quality fodder source.

Pigs are fed on sweetpotato vines and cassava peels.



Credit: ILRI/Emily Ouma.

Collection of crop residues for pigs, largely the role of women and children.



Credit: ILRI/Emily Ouma.

The ratings of forages and crop residues as well as reasons why farmers identified them as good forages are depicted in Table 21.

Table 21. Rating of forages/crop residues by pig farmers

Fodder/ crop residue	Score	Attribute
Sweetpotato vines	7	Very palatable Give satisfaction to pigs Boost growth and milk production
Cassava leaves	6	Reduce fats in pigs Very palatable Give satisfaction to pigs Boost growth Have medicinal effects
Yam leaves	5	Very palatable, Give satisfaction to pigs
Amaranthus sp.	3	Very palatable Rich in vitamins
Pig weed	2	Very palatable Give satisfaction to pigs Boost growth

Among all attributes, palatability was considered the most critical. For instance, farmers recognized that sweetpotato vines promoted milk production when fed to lactating sows; while cassava leaves were preferred for their medicinal role especially in deworming. Amaranth was considered a rich source of vitamins by farmers and hence they frequently referred to it as highly nutritious.

The use of forages and crop residues as feed resources are still underexploited as they are currently only limited to harvesting periods due to their perishability when not properly preserved as silage. In the case of cassava leaves, utilization is often immediately after harvesting, resulting in subclinic toxicity due to the cyanogenic glycoside that is present in the leaves. This can be easily controlled by allowing for some wilting to take place before offering it to animals.

Breeds and breeding

Members of the focus group discussion were asked various questions in relation to the use of different pig breed-types, as well as breeding management. Pig breed-types were considered at the level of ‘local’, ‘exotic’ and ‘crossbreed’ (specifically between local and exotic), as a previous study had shown that pig farmers could not generally assign exotic animals into more defined breed types (such as Large White, Landrace, Camborough etc.). For some questions the group members were divided into subgroups of ‘breeders’ (those who sell piglets) and ‘growers’ (those that buy or rear piglets for fattening and slaughter sale), to assess whether differences between these subgroups existed. The total number of respondents across all 34 focus groups was 254 (99 male and 155 females).

Representation of breed-types, currently and in comparison to five years ago

Respondents were asked to indicate the proportion of pigs of each breed-type (local, crossbreed, and exotic) within their area, both currently and five years ago. As shown in Figures 52 to 54, all groups reported each of these breed-types currently present in their area; with the exception of Kabukolwa who reported no local breed (this result requires further validation). Of note is that 13 out of 17 groups within the rural to rural value chain, and four out of seven groups in the rural to urban value chain, reported that the local breed was predominant in their area, whilst in the urban to urban value chain all 10 groups reported that either crossbreed or exotic animals were predominant.

Figure 52. Representation of the different breed-types for village areas within the rural-rural value chain, broken down by village and sub-county of origin.

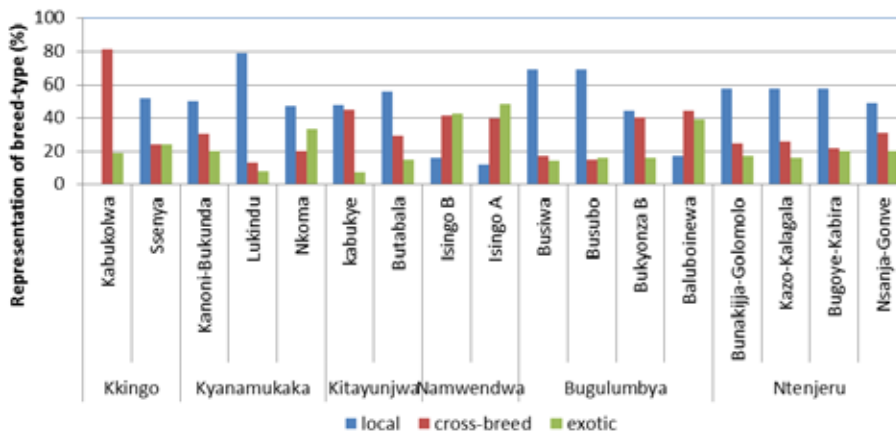


Figure 53. Representation of the different breed-types for village areas within the rural-urban value chain, broken down by village and sub-county of origin.

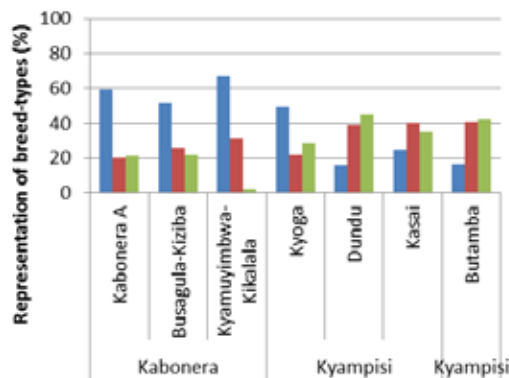
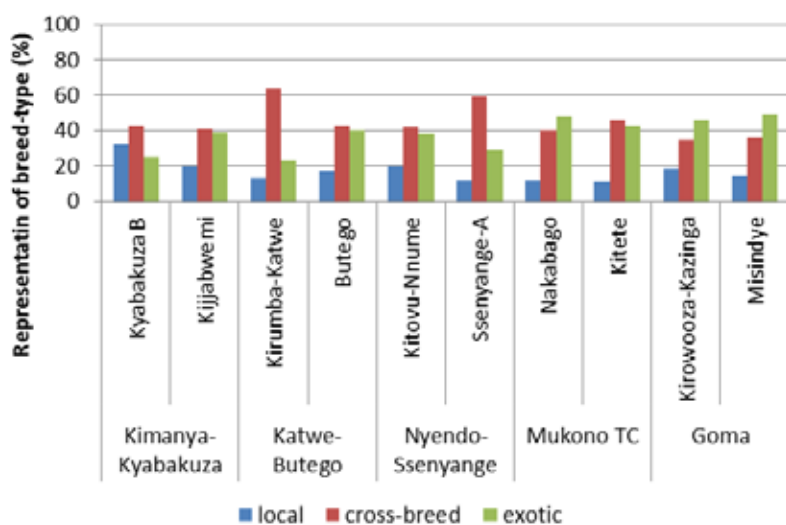


Figure 54. Representation of the different breed-types for village areas within the urban to urban value chain, broken down by village and sub-county of origin.



The reported change in breed type in comparison to five years ago is given in Table 22. In both the rural-rural chains, and rural-urban chains, almost one-third of groups reported an increase in the proportion of local breed, with an accompanying decrease in the proportion of crossbreed and exotics, suggesting that the keeping of crossbreeds/exotics was not sustainable in these sites. In the urban-urban chain, all groups reported an increase in the proportion of crossbreed/exotic animals.

Table 22. Reported change in the representation of breed type in comparison to five years ago.

Value-chain domain	District	Number of groups reporting change		
		Decrease in local breed/increase in crossbreed and exotic	Increase in local breed/decrease in crossbreed and exotic	No change
Rural to rural	Kamuli	5	2	1
	Masaka	2	1	2
	Mukono	0	2	2
Rural to urban	Masaka	1	1	1
	Mukono	3	1	0
Urban to urban	Masaka	6	0	0
	Mukono	4	0	0
Total groups		21	7	6

Note: 1. A change of $\leq 5\%$ was considered as no change

Drivers of breed change

The main drivers of breed change reported by groups where the proportion of crossbreeds and exotics was increasing over the last five years (21 groups in total) were that these breed types, in comparison to the local breed, grew faster (19 groups), were more marketable or sold quicker (11 groups), reached a higher weight (8 groups), and farrowed more piglets (6 groups). In addition, a further reported driver was that training had been received on the keeping of crossbreeds/exotics (seven groups).

For groups reporting an increase in the proportion of local breed types over the last five years (seven groups in total), the main drivers of change were given as the crossbreeds or exotics requiring special or expensive feed (seven groups), health-care (seven groups), or housing (four groups) and that the crossbreeds or exotics were expensive to purchase (four groups).

Organizations reported by two or more focus groups as supporting a change in breed-type (typically from local to crossbreed/exotic) are summarized in Table 23. Of note is the support from NAADS in all sub-counties, World Vision in five sub-counties, and Caritas-MADDO in four sub-counties. In addition support by Nserester farm was given two sub-counties, and by VEDCO and Plan Uganda in one sub-county each. The type of support provided by these organizations was reported as the provision of pigs, inputs such as feed, health-treatment and housing materials, and training on the keeping of crossbreed or exotic animals. Of interest is that only three focus groups (Dundi, Bugoye-Kabira, and Lukindu) reported no supporting organization, with two of these groups (Bugoye-Kabira, and Lukindu) reporting an increase in the proportion of crossbreed/exotics.

Table 23. Organizations supporting the change in breed-type*

Urban–urban	Value-chain domain type	
	Rural–urban	Rural–rural
Masaka district	Masaka district	Masaka district
(i) Katwe-Butego: NAADS, World Vision	(i) Kabonera: NAADS, World Vision	(i) Kyanamukaka: NAADS, World Vision, Nserester farm
(ii) Kimanya-Kyabakuza: NAADS, World Vision, Caritas-MADDO		(ii) Kkingo: NAADS, World Vision, Caritas-MADDO
(iii) Nyendo-Ssenyange: NAADS, Nserester farm	Mukono district	
	(i) Kyampisi: NAADS, FHU, Caritas-MADDO	Mukono district
		(i) Ntenjeru: NAADS
Mukono district		
(i) Goma: NAADS		Kamuli district
(ii) Mukono town: Caritas-MADDO		(i) Bugulumbya: NAADS, VEDCO
		(ii) Namwendwa: NAADS (iii) Kitayunjwa: NAADS, Plan Uganda

1. Included is any organization named by two or more PRA groups: not listed are organizations, self-help groups, or individuals named by a single PRA group.
2. NAADS = National Agricultural and Advisory Services

Socio-economic groups where change in breed-type from local to crossbreed /exotic was more noticeable was reported to include groups that were wealthier, targets of organizations providing support on keeping crossbreeds/exotics, that were trained on the keeping of crossbreed/exotic animals, or organized into farmers groups or co-operatives.

Key characteristics or traits preferred in pigs

The key characteristics required in pigs for reproduction or piglets for fattening, as accessed by the number of breeder or grower groups reporting that characteristic respectively, are given in Tables 24 and 25. It is of note that these key characteristics were the same for both breeder and grower group. A high number of teats (greater than 12 or 14) were considered important by all breeder groups, as could be expected given breeder groups raise piglets to weaning age. It is unclear why some grower groups also considered this characteristic important, though this may be reflecting the proportion of respondents that were both breeders and growers [see full report for further detail on this]. Pigs that are ‘horizontally long enough/good size’ presumably fetch higher market prices, whilst further investigation is required on why floppy ears and short mouths are considered desirable. An exercise where group members rated each breed-type for these characteristics indicated that, for all characteristics, exotics were perceived to out-perform crossbreeds which in-turn were perceived to out-perform locals.

Table 24. Key characteristics or traits required in pigs, as cited by piglet producers

Characteristics ¹	Breeder groups			Total groups (35 groups total)
	Rural to rural (18 groups total)	Rural to ur- ban (7 groups total)	Urban to urban (10 groups total)	
High number of teats	17	7	10	34
Horizontally long enough/good size	16	6	10	32
Floppy ears	14	7	8	29
Short mouth	6	6	5	17
Fast growing	7	0	3	10

1. Given are the principal five characteristics based on number of groups reporting.

Table 25. Key characteristics or traits required in pigs, as cited by growers

Characteristics ¹	Grower groups			Total groups (34 groups total)
	Rural to rural (17 groups total)	Rural to urban (7 groups total)	Urban to urban (10 groups total)	
Horizontally long enough/good size	13	7	10	30
Floppy ears	14	4	8	26
Short mouth	5	5	5	15
Fast growing	5	1	2	8
High number of teats	3	1	4	8

1. Given are the principal five characteristics based on number of groups reporting.

Preferred breed-types and constraints to utilizing the preferred breed-type

Table 26 summarizes the main breed-types currently kept, as well as preferred, for both breeder and grower groups. In the majority of cases those keeping local breeds would prefer to keep crossbreeds or exotics, whilst those keeping crossbreeds would prefer to keep exotics. In one breeder group (Lukindu) and two grower groups (Lukindu and Nkoma) the local breed-type was both currently kept and preferred. In no case did a group currently mainly keeping crossbreeds or exotics indicate they would prefer to keep the local breed (including groups who had indicated the proportion of local breed-type was increasing in their area).

Table 26. Number of groups indicating a preferred breed-type of local, crossbred or exotic

Domain	Current main breed-type = local			Current main breed-type = crossbred		Current main breed-type = exotic
	Preferred breed-type = local	Preferred breed-type = crossbred	Preferred breed-type = exotic	Preferred breed-type = crossbred	Preferred breed-type = exotic	Preferred breed-type = exotic
Breeder groups						
Rural to rural (18 groups total)	1	7	7		2	
Rural to urban (7 groups total)		4	1		2	
Urban to urban (10 groups total)					8	2
Grower groups						
Rural to rural (18 groups total)	2	5	7	2	1	
Rural to urban (7 groups total)		4	1		2	
Urban to urban (10 groups total)				2	7	1

The key constraints to utilizing the preferred breed-type are summarized in Table 27 for breeder groups and Table 28 for grower groups. The most commonly cited constraints were the same whether for breeder or grower groups, or whether moving from local to crossbred/exotic, or from crossbred to exotic, and did not tend to be specific to the value-chain domain. Namely these constraints were related to crossbred/exotics requiring improved management (health-care, housing and feed), being expensive to buy, or being scarce in the area. It is of note that the reported support provided by organizations working within the area to promote the keeping of crossbred or exotic animals aligned with addressing these constraints (see section 'Drivers of breed change').

Table 27. Key constraints in moving from current to preferred breed-type for breeders (as expressed by the no. of focus groups identifying a particular constraint)

Constraint ¹	Breeder groups: change from local to crossbred or exotic				Breeder groups: change from crossbred to exotic			
	Rural to rural (14 groups total)	Rural to urban (5 groups total)	Urban to urban (0 groups total)	Total groups (19 groups total)	Rural to rural (2 groups total)	Rural to urban (2 groups total)	Urban to urban (8 groups total)	Total groups (12 groups total)
Need for special/expensive health-care	9	4	0	13	1	2	4	7
Need for special/expensive housing	8	4	0	12	1	1	4	6
Need for special/expensive feed	7	4	0	11	2	2	5	9
Expensive to buy	8	1	0	9	0	1	5	6
Scarce in area	5	0	0	5	0	1	3	4

1. Given are the principal five constraints based on number of groups reporting

Table 28. Key constraints in moving from current to preferred breed-type for growers (as expressed by the no. of focus groups identifying a particular constraint)

Constraint ¹	Grower groups: change from local to crossbreed or exotic				Grower groups: change from crossbreed to exotic			
	Rural to rural (12 groups total)	Rural to urban (5 groups total)	Urban to urban (0 groups total)	Total groups (17 groups total)	Rural to rural (1 group total)	Rural to urban (2 groups total)	Urban to urban (7 groups total)	Total groups (10 groups total)
Need for special/expensive health-care	5	3	0	8	1	0	3	4
Need for special/expensive housing	7	2	0	9	1	1	5	7
Need for special/expensive feed	2	2	0	12	1	1	3	5
Expensive to buy	7	5	0	12	0	1	6	7
Scarce in area	4	1	0	5	1	0	2	3

¹ Given are the principal five constraints based on number of groups reporting.

Source of animals

Breeding sows and boars, as well as piglets for fattening, were generally sourced from other farmers within an individual's own or neighbouring village. In some cases animals were sourced from supporting organizations or commercial farms.

Mating control

The only mating control strategy reported (by 18 of the 34 focus groups) was avoidance of the mating of relatives. The use of seasonal mating was not reported by any groups.

Breeding related constraints

The main constraints to breeding, as reported by the groups, is given in Table 29. Note that the named constraints tend not to relate to breeding per-se, but more generally to aspects of reproduction (abortion), piglet survival (lactating sows lack milk, sows eat piglets, sows sleep on piglets), or herd health (disease).

Table 29. Key constraints to breeding, (as expressed by the no. of focus groups identifying that constraint)

Constraint	Rural to rural (17 groups total)	Rural to urban (7 groups total)	Urban to urban (10 groups total)	Total groups (34 groups total)
Lactating sow lacks milk	14	7	3	24
Sow eats piglets after farrowing	9	5	5	19
Disease (not specified further)	7	3	6	16
Sow sleeps on piglets	5	2	3	10
Abortion	3	2	4	9

¹ Given are the principal five constraints based on number of groups reporting

Other constraints (more breeding related) included lack of transport to take sows to boars (five groups), lack of boars (two groups), and lack of capital for servicing sows (two groups). All constraints were considered to be related to a lack of information/knowledge. Additionally, the sows eating or sleeping on the piglets was considered by some groups

to be related to a lack of land/water (as presumably this is linked to a lack of piglet rearing space), and by a smaller number of groups due to lack of capital or labour (Table 30).

Table 30. Causes of constraints to breeding, (as expressed by the no. of focus groups reporting that cause)

Constraint	Land and water	Labour	Capital	Information/knowledge
Lactating sow lacks milk (24 groups total)				24
Sow eats piglets after farrowing (19 groups total)	4		2	19
Disease (not specified further) (16 groups total)			10	16
Sow sleeps on piglets (10 groups total)	8	1	1	5
Abortion (9 groups total)				9

Pig health and husbandry practices

Housing typologies

Three major types of pig management typologies exist in the sites. The common type in the rural value chains was tethering and free range/scavenging while in the urban–urban value chain, confinement in corrals with either raised or non-raised floors was common (Table 31).

Table 31. Proportion (%) of farmers and associated pig management typologies practised

Pig management typology	Rural–rural (n = 170)	Rural–urban (n = 90)	Urban–urban (n = 80)
Tethering	62	40	13
Housed	Housed raised floor	5	6
	Housed not raised floor	16	36
Free-range/Scavenging	17	18	1

Free range/scavenging (extensive system)

This management type is seasonal and of low input. Animals are left to scavenge during the day and confined either in house or tethered during the night. Scavenging occurs mostly during the dry season. Piglets are often left to scavenge since they are less harmful to crops and are also difficult to tether given their small size. Exotic breeds are often not allowed to scavenge as they are considered to be more susceptible to diseases and environmental stresses and also due to their monetary value.

Piglets scavenging in a rural setting in Mukono and Wakiso districts respectively.



Credit: ILRI/Emily Ouma.

This management type relieves farmers of the need to collect or purchase feeds as it is assumed that the pigs find adequate food and sufficient nutrients through scavenging. It also allows sows to access breeding boars within the system when farmers do not have their own boars or enough money to pay for breeding service. Most of the farmers who practiced this system indicated that they lacked funds to construct proper housing for their pigs. Under the free range system, the risk of accidents and theft increases because pigs are exposed to external environment and are often not under direct control of their owner. The major disadvantage with this system is the potential for crop destruction by pigs which may lead to conflict with crop-producing neighbours. The management system was mainly practiced by 17–18% of farmers in rural–rural and rural–urban value chains where space is more available and animals are less exposed to accident caused by vehicle traffic. In urban settings, only 1% of farmers practiced this technique given the limited space and the fact that the risk to vehicle accidents and theft is high.

Confinement in corrals (intensive system)

This management type was common in urban–urban value-chain domain with 86% of households practising it. Compared to free range/scavenging, it is a relatively high input system where pigs are confined in a corral where they are fed and watered. Construction of a corral may be done with a combination of different materials used to make the floor (cemented, concrete made of off-cuts walls, or earth), the wall (timber, stem, brick or planted trees) and the roof (iron sheet, grass, papyrus, polythene or left open). The floor of a corral can be elevated or constructed at the level of the earth.

According to farmers, confining pigs in corrals has several advantages. In terms of security, pigs are protected against predators like wild animals, dogs and thieves. Disease spread could be attenuated because of restricted movements, while conflicts with neighbours due to crop damage can be avoided especially during the cropping season. Furthermore, manure can be collected easily and hygiene improved. Feed wastage is reduced because feeders are placed inside the corrals. Most farmers with improved breeds practiced this system because of the susceptibility of the pigs to disease and environmental stress. However, after every four months some farmers release their animals to look for supplementation especially iron usually obtained through ingested red soil. The system is labour intensive since feeds and water have to be brought to the pigs in the corral. Two types of housing exist: the raised floor and the non-raised floor.

a) *Corral-raised floor*: The floor is elevated and is not in contact with the earth. It is made of timber and some space left in-between. This technique is considered to be very hygienic because urine is eliminated easily, thereby making pigs clean. However, according to farmers, growth is slower when pigs are housed in raised floors due to stress associated with living under the elevated corral.

b) *Corral non-raised floor*: The floor is not elevated and is in contact with the earth. It could be cemented or made of concrete or earth. In this case, pigs are also clean and elevation stress is reduced. The manure is easily collected and

the floor can be easily cleaned. In the case when the floor is not cemented pigs can be very dirty because of their direct contact with the soil. However, the housing structure could be expensive depending on the type of material used. Most farmers who are able to afford expensive housing for their pigs are medium to large-scale holders who own, at least, more than five pigs and have a higher financial capacity. In some cases, the floor is made of grass or left idem with the soil and farmers usually have more than one pen for purposes of cleaning conveniently.

A raised house with wall and floor made of wood and iron sheet roofing—Masaka.



A non-raised house with cement floor, timber walls and iron sheet roofing—Mukono.



Credit: ILRI/Michel Dione.

Non-raised house, earthen floor, walls made of wood—Masaka.



Non-raised house, walling made of wood and roof from banana leaves—Masaka.



Credit: ILRI/Emily Ouma.

Tethering (semi-intensive/extensive system)

In this system, pigs are tethered on a tree under a shade in the compound or in the bush near the compound and moved from tree to tree to maintain the shade and allow change of feeds. Feeds often comprise crop residues or grass. If the pigs are tethered in the compound, feeds are brought to them. The ropes are changed from one leg to another to minimize injury which commonly occurs with this system. It is a cheap technique and is easy to restrain the pigs if they are to be transported for breeding. Since the pigs are tethered, the risk to contract diseases is reduced and manure is produced on site. This system also prevents pigs from damaging crops thereby reducing potential conflicts with neighbours. It is mostly local breeds and pigs that are more than four months old that are tethered. Farmers who practiced this technique indicated that insufficient space to allow the animal to scavenge and lack of funds to construct pig corrals or purchase feeds were the reasons behind their choice. Farmers practising tethering are usually smallholders who often have few pigs (one–three) which are easy to manage.

The main disadvantage associated with this system is the injuries which often occur on the legs as a result of roping. Worse still, animals are also exposed to predators like dogs because of their inability to escape when attacked. A large number of farmers, 62% and 40% in rural–rural and rural–urban value-chain domains, respectively, practiced this management type.

An adult pig tethered under a tree shade.

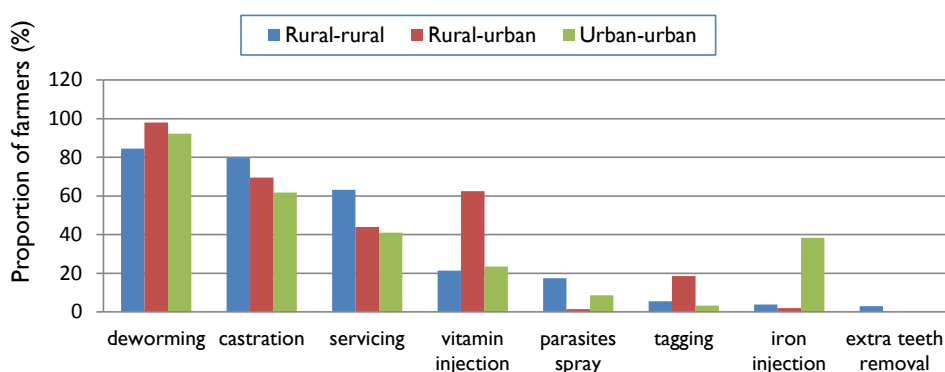


Credit: ILRI/Emily Ouma.

Husbandry practices

Several pig husbandry practices were practiced by farmers. These included castration, deworming, iron injection, breeding management, vitamin and iron supplementation, external parasite spraying and extra teeth removal. Farmers (both females and males) were majorly responsible for monitoring these practices. Service providers were mainly the experienced farmers or village veterinarians (often para-veterinarians). Figure 55 shows the proportion of farmers who practice various husbandry practices.

Figure 55. Proportion of farmers adopting the different husbandry practices.



Deworming: Ninety three percent of farmers deworm their pigs at least once before the pigs are sold or slaughtered. They believed that deworming results in faster growth. However, a proper deworming schedule is not followed. Most of the time, growers and fatteners deworm when a piglet is entering the farm and few days before pigs are sold. In most cases, farmers buy the drugs and do self-administration. The cost of an injection varied between USD 1 to 1.8; a tablet costs between USD 0.2 to 0.8 for piglets and USD 0.8 to 1.2 for adults pigs. For drenching, the cost is higher and can go up to USD 8. The most commonly drugs used for deworming are albendazole and ivermectin.

External parasites spraying: Thirty seven per cent of farmers used acaricide sprays for external parasites which are dominated by mites, lice, flies (especially jiggers) and ticks. The cost varied between USD 2 to 6 per treatment.

Multi-vitamin supplementation: Multi-vitamin supplementation is usually combined with deworming when sows are around two months pregnant to boost growth or strengthen the animal. The cost of one injection varied between USD 0.4 to 2.

Castration: Castration is commonly practiced (77% of farmers). This practice is done either by the para-veterinarian, a skilled and experienced traditional farmer referred to as ‘village castrator’ or in very rare cases, the farmer himself. The service is done mostly at around two weeks of age and can cost up to USD 1.2.

Breeding services: Farmers or the other family members are responsible for serving their sows when heat is detected. The sow is transported to the ‘village boar’ or to a neighbour’s boar. The cost of service varies between USD 4 to 20 depending on the location, source of service, breed and the quality of the boar. Payment is either through cash or in-kind (in the form of a piglet).

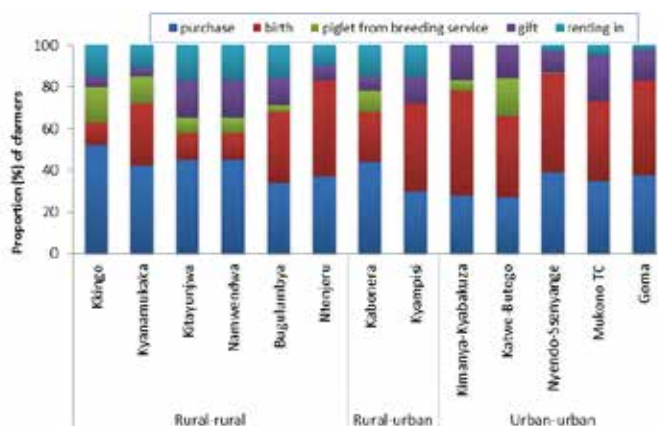
Iron supplementation: Iron injection is practiced by few farmers, and is more common in urban areas (39% of farmers). The cost per dosage is between USD 0.4 to 1.4 and in most cases is applied by the para-veterinarian. Most farmers who were not able to meet the cost of the iron injection released their pigs to scavenge, as a means to allow them ingest ‘red soil’. Some farmers also may add red soil in piglet’s food at one week of age as an iron supplement. The lack of iron for the sow, may lead to anaemia at birth, a commonly observed symptom in piglets.

Extra teeth removal: This seems not to be a common practice as it requires good technical knowledge. Given the lack of qualified health workers, especially veterinarians, it could be that ignorance about the need to apply such a practice as well as lack of equipment (special cutters) to do so, make the practice rare.

Pig herd dynamics

Figure 56 shows the sources of herd entries in the various value-chain domains. Common sources of herd entry during a one-year cycle in the urban–urban value-chain domain (e.g. in Kimanya-Kyabakuzi, Nyendo Ssenyange and Goma sub-counties) were from births comprising 38–50%. Entry through purchases was common in the rural–rural value-chain domain (33–52%), especially Kkingo, Kitayunjwa and Namwendwa sub-counties. Renting—in was relatively common in the rural–rural and rural–urban value chains compared to the urban–urban, possibly due to strong social networks through families in the rural areas or as a result of feed scarcity.⁸

Figure 56. Community herd entry.



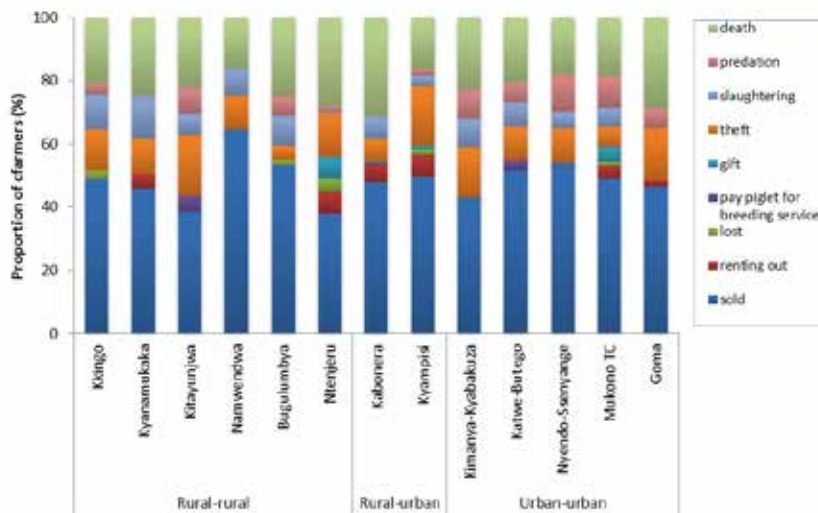
Herd entries through in-kind payments in the form of piglets resulting from provision of boar services were relatively high in the rural areas. This is due to the common practice of communal village breeding boars in the rural areas.

8. Renting-in is the practice of giving away a sow to a relative or a neighbour and sharing the resulting piglets or cash from sale of piglets after farrowing. It is a useful practice that allows farmers to distribute their pigs especially when they are resource-constrained and unable to care for their animals.

Receipt of piglets as gifts during social events or through development programs implemented by NGOs or NAADS were also important sources of herd entry in some of the sub-counties, especially in the urban–urban value chains.

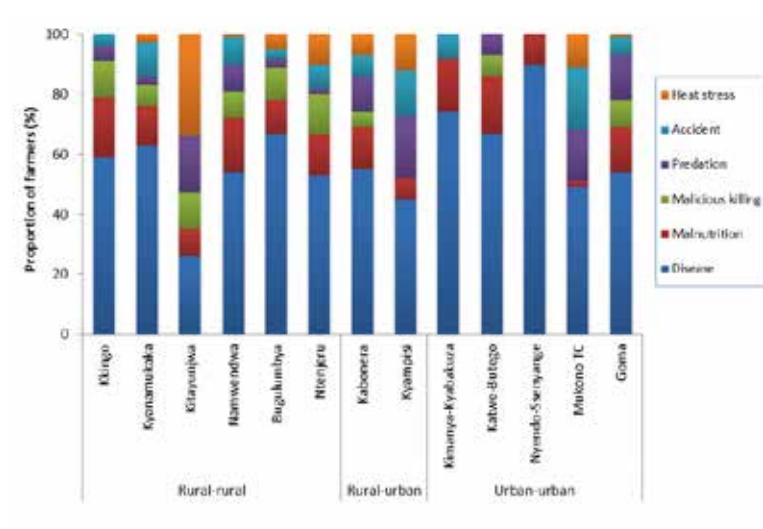
Herd exits were largely through sales for income generation and deaths accounting for 38–65% and 16–31% respectively (Figure 57). An average of 5% of the communal herds left through slaughter for home consumption, especially during festive seasons. Piglet theft was also relatively common in all sub-counties and comprised between 5–20% of herd exits across the sub-counties. This was common in cases where piglets were left to scavenge.

Figure 57. Community herd exit.



The main cause of herd exit through death was diseases in most of the sub-counties (45–90%), except in Kitayunjwa where heat stress was also a major cause of death (Figure 58). Occurrence of death through heat stress was relatively common in the rural areas, where there was lack of housing for pigs and most pigs were tethered in unshaded areas. Death at farrowing and through accidents was also common including cannibalism of piglets by sows at birth due to phosphorous deficiency. Malnutrition was the second major cause of deaths in most of the sub-counties, accounting for up to 20% of deaths.

Figure 58. Causes of pig death.



Death through malicious killing by unidentified persons was common in most of the rural sites. This was common in cases where pigs were left to scavenge, thereby becoming a nuisance to neighbours.

Disease prioritization and impact on production

African swine fever (ASF) and parasite infections, especially worms and mange, were the most prevalent diseases with ASF being most fatal with a case fatality rate of 77.5%. Although ASF seems more serious because of its high case fatality rate, worm infection is the most prevalent (Table 32). This shows that most diseases occur in an endemic state and their impact on production could be important with time. ASF causes severe economic losses to farming families. Vaccines are not available to prevent the disease. Biosecurity and quarantine measure are also very poor, resulting in rapid spread of the disease. ASF is mentioned by key informants in Kamuli as the most critical disease. Some farmers react to it by selling off their animals before quarantine is imposed, while others seek treatment (Annex 8.10).

Table 32. List of priority diseases according to farmers' perception

Disease	Rural-rural (n = 170)			Rural-urban (n = 90)			Urban-urban (n = 80)		
	Morbidity (%)	Mortality (%)	Case fatality (%)	Morbidity (%)	Mortality (%)	Case fatality (%)	Morbidity (%)	Mortality (%)	Case fatality (%)
ASF	29.8	23.1	77.5	43.1	31.8	73.6	15.8	7.5	47.5
Worms	55.1	12.0	21.9	35.0	5.0	14.4	22.3	1.8	8.3
Mange	16.1	1.9	11.5	14.8	1.1	7.5	14.0	0.4	2.8
Lice	9.8	0.3	3.6	7.5	0.0	0.6	1.1	0.0	0.3
Midge	1.3	0.0	0.0	0.1	0.0	0.0	1.1	0.0	0.3
Diarrhoea	5.8	1.3	4.7	4.6	0.7	5.4	5.6	0.5	4.2
Malnutrition	2.4	0.1	2.6	3.6	0.0	0.9	4.3	0.1	3.2
FMD	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.1
Others*	0.0	0.0	0.0	3.8	0.2	4.9	0.3	0.0	0.8

*Swine erysipelas, anaemia, ticks, jiggers, heat stress, fever, undiagnosed diseases usually related to sudden death

FMD was only mentioned in two villages in Masaka, while diarrhoea, a widely distributed syndrome affects mainly piglets in all districts. Ectoparasites namely mange, jiggers (only mentioned in Kamuli district), lice, and ticks were very common. They contribute to skin alteration and loss of weight in pigs. Heat stress and few undiagnosed diseases, whose symptoms were related to sudden death, were mentioned by farmers.

Farmers were asked to describe symptoms related to diseases mentioned, types of pigs affected, seasonality of occurrence, effect of the disease and the curative treatment applied. Annex 8.8 shows a summary list of diseases in their local names and their symptoms. The common symptoms by farmers were in good concordance with the disease for all cases. The common term '*omusujja*' was used by farmers to mention swine fever. But according to some key informants, 'swine fever' meant 'ASF to the farmers'.

Farmers attempt to treat diseases when they occur and treatment is usually effective. They can treat themselves by buying drugs from a drug seller, call a veterinary doctor or use a 'village vet' service in most of cases. According to the veterinary service officers from the three districts, outbreaks especially for ASF cases were poorly recorded and not always confirmed at the laboratory. The veterinary officers advised farmers on biosecurity measures based on case suspicion considering only clinical signs. Samples are occasionally collected and sent to the National Diagnostic Laboratory (NADDEC), but feedback of laboratory results is usually very slow or not given at all. Whenever the disease occurs, farmers often respond by immediately selling off the animals in fear of losing their entire investment. However, some farmers attempt to treat their animals by administering concoctions of local herbs (*muluza*, *kigagi*, *ekisula*, *ekifufumu*, *omululuza*) or human urine which they perceive as meagrely effective (Annexes 8 and 9).

Dewormers, such as Ivermectin, are usually used by farmers to treat their pigs against internal parasites due to its convenience of administration and the drug's broad-spectrum. Some farmers use Ivermectin drug mainly for the treatment of mange only. This is a better approach since it is also a good dewormer for the internal parasites. To control external parasites, farmers use Ivermectin and acaricides called '*ambush spray*'. Tobacco extracts (*muluku*) and used engine oil are often smeared on the skin of pigs to prevent external parasites especially lice and mange. This is presumed to aid in removing the parasites from the pig's body. The use of engine oil is a common practice in the rural

communities. Other farmers scrub their pigs with soap while some dig up shallow ponds and let the pigs wallow and the mud that mats the pigs is presumed to kill external parasites. However, if the environment where the pigs stay is not clean, parasites cannot be eliminated for a long period.

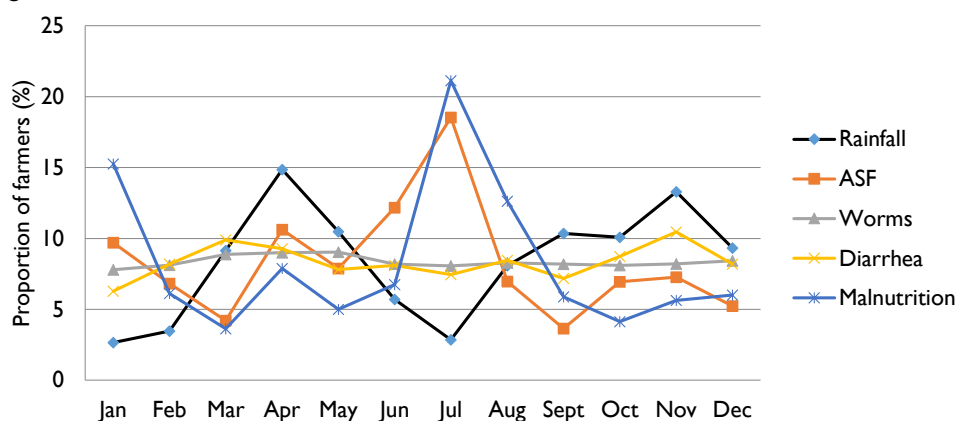
Methods used by farmers for parasite control are usually considered by them as very effective. However, a large number of farmers apply treatment to their pigs without any proper administration schedule necessary for these treatments to be truly effective. This might explain why, in spite of all treatment applied against parasites, their burden remains.

Farmers use a range of antibiotics and multivitamins to treat diseases and also for prophylaxis. Drug administration schedules differ from one farmer to another. Some farmers believe that if an antibiotic remains in the body of a pig, it cannot suffer from disease and so they administer antibiotics frequently (usually weekly or monthly) regardless of disease status of the pig. Other farmers administer antibiotics only when they realize that the pig is sick or has a fever. In this case, they don't call a veterinarian for a diagnosis because of lack of money to pay for the service. Another category of farmers would call a para-veterinarian to inject one dose of antibiotic or multi-vitamin just before the onset of outbreak of ASF. Multivitamins are also commonly used to boost growth of pigs. These are usually administered when the pig enters the farm and during the fattening period until the pig is sold. Generally, disease control measures should be addressed as a package, including the treatment of specific diseases, hygiene in the farms, biosecurity and nutrition.

Seasonal calendar of occurrence of diseases and parasites

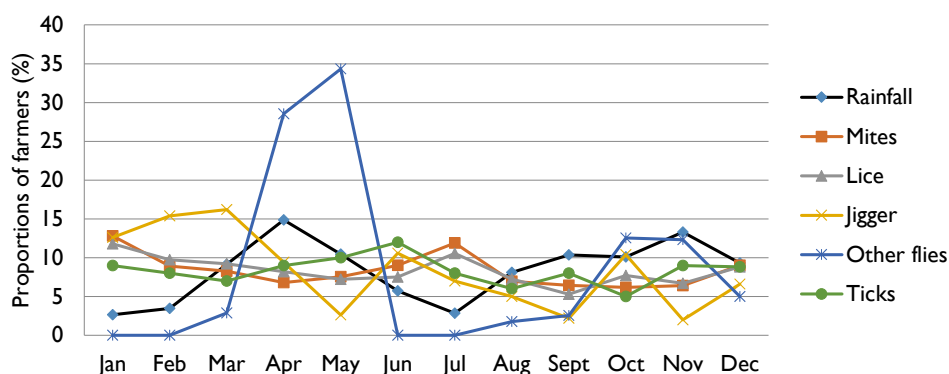
Several diseases were considered by farmers to be seasonal. For ASF, outbreaks were more frequent during the dry season. Flies (mainly midges) were most common during wet season. Malnutrition was more common during drought and dry season when bran is expensive. Diarrhoea which is related to poor hygiene and nutrition, together with worms, ticks and lice appeared all year round. Lice and jiggers are strongly associated with poor hygiene of the piggery. Mange and flies (midges) were more common during wet season (Figures 59 and 60).

Figure 59. Seasonal variation in disease occurrence.



*FMD was reported in only one village (Kirumba-Katwe) in Masaka district.

Figure 60. Seasonal variation occurrence of ectoparasites.



*jiggers were only reported in Kamuli district.

Impact of disease on production

ASF usually causes high mortality. It is an epidemic disease and appears every year. Diarrhoea affects mostly piglets of one-to-four months old and is usually fatal. Parasites can affect all breeds but local breeds are more exposed because they are affected by poor health and nutritional care. These infections can lead to high morbidity with stunted growth, emaciation and loss of weight; sometimes, secondary infections may occur, leading to mortality. Parasitic infections can reduce the market value of pigs. Malnutrition and anaemia are results of poor feeding and parasitic infection respectively. Anaemia can cause mortality in sows following farrowing. FMD and swine erysipelas are sporadic infections which appear once to twice a year, and they can lead to carcass condemnation or mortality (Annex 8.9).

ASF has the potential to wipe out an entire pig herd.



Credit: ILRI/Michel Dione.

Perceptions on food safety, nutrition and zoonoses

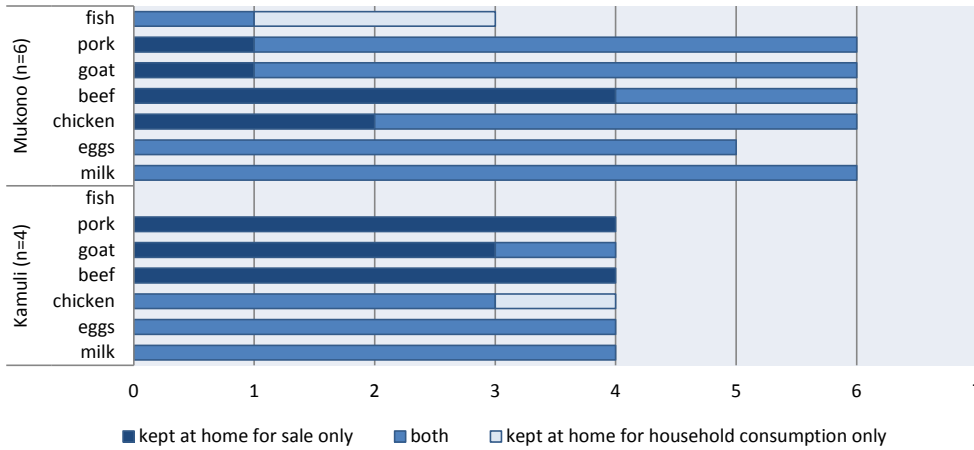
Ten focus group discussions with pig producers and consumers were conducted in four villages in Kamuli and six villages in Mukono districts. Discussions focussed on pork consumption aspects including preparation, knowledge, attitudes and practices, as well as perceptions of public health risks associated with its consumption.

Link between household livestock keeping and consumption

Generally, livestock were kept for sale and to supplement family diets. Cattle were reportedly kept for milk and sold off for slaughter at a later time (Figure 61). Similarly, poultry were mainly kept for eggs to sell and for home consumption as well. Most pig producers (89%) were also pork consumers. A few of the producers did not consume

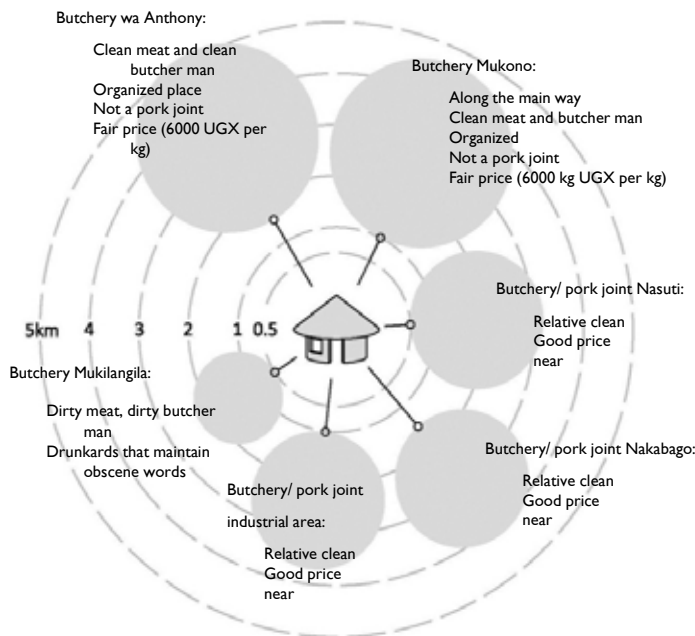
pork due to religious beliefs. In the rural value chain in Kamuli, most pig producers did not consume their own pigs, but rather kept them as assets to generate cash in times of need and bought only 1kg of pork for home consumption whenever they could afford it. In the rural and more urban areas in Mukono district, more than 80% of livestock keepers indicated that they kept pigs for both sales and home consumption.

Figure 61. Livestock production and consumption.



In all the study sites, people usually buy pork at road-side butchers or at ‘pork joints.’ The latter are especially popular in Uganda (Figure 62) and pork is consumed as fried (Kamuli) or roasted (Mukono, Masaka and Kampala). In rural areas, the consumers are mostly men, whereas in towns both men and women gather at pork joints for lunch and at night to watch football or soap operas, play pool, or simply socialize over pork and drinks.

Figure 62. Sources of pork and distance from households in Kitete village in Mukono.



Note: Importance of the source is denoted by size of the circle.

The role of pork in household diet quality

Livestock products commonly consumed in villages included pork, chicken, goat, beef and cow milk. Eggs were explicitly mentioned in all villages except one in Mukono district. Turkeys, ducks and rabbits were consumed occasionally in most villages in Kamuli and some villages in Mukono district (Figures 63–64). All villages in Mukono indicated that they consumed fish on a regular basis. The fish consumed mostly included *Rastrineobola argentea*, locally known as ‘mukene’ and also tilapia and Nile perch. In Kamuli district, fish was rarely consumed, and was only mentioned in one village due to the long distance to source points—Lake Victoria (60+ km) and Lake Kyoga (25+ km). Ghee was consumed in both districts, but more often in Mukono district. Mutton was consumed in only 33% of the villages in Mukono and none in Kamuli district. The frequency of consumption of the various animal source foods varied in rural and urban areas, with higher consumption frequencies reported in areas closer to urban areas. For instance, in Mukono, the frequency of meat consumption (chicken, beef, pork, and goat) was higher than Kamuli, where it was only consumed occasionally. Average meat quantities purchased at a given time was 1 kg and for poultry, 1 bird per household.

Figure 63. Frequency of animal source food consumption in Mukono district (n = 6 villages).

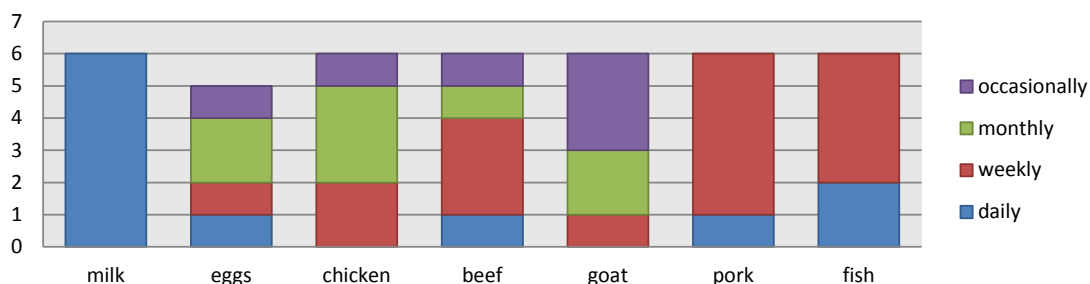
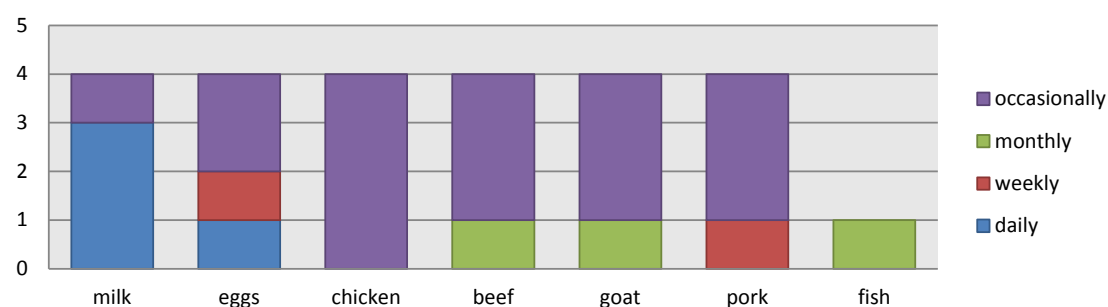


Figure 64. Frequency of animal source food consumption in Kamuli district (n = 4 villages).

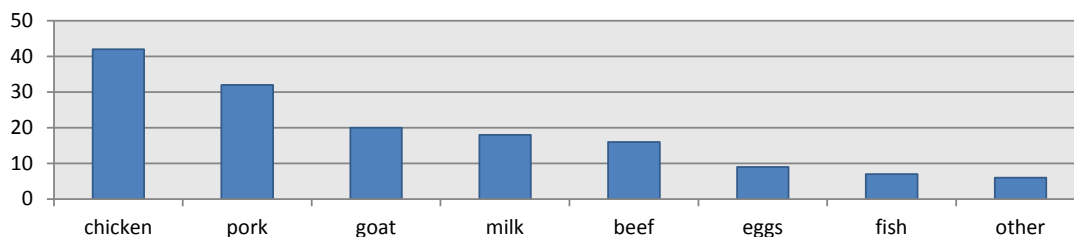


Milk was the most frequently consumed animal source food. On average, quantities consumed are one–two cups per household at any given time. Mothers of young children in rural Mukono indicated preference for goat milk for their children as they considered it to be highly nutritious though very scarce.

Perceptions on pork taste and nutrition

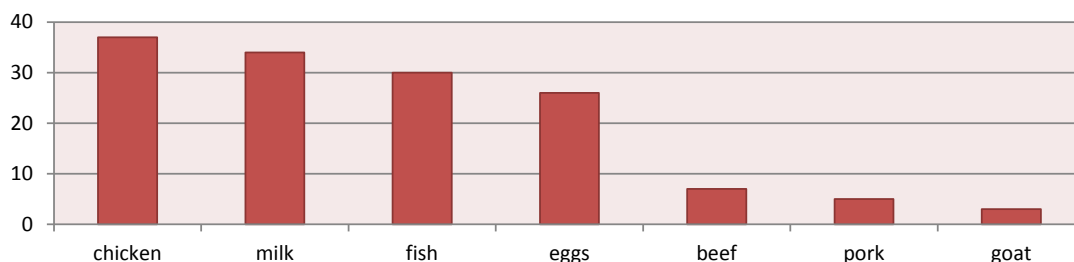
According to the respondents, taste is the main reason for pork consumption. It is considered ‘so tasty’, and rated second to chicken (Figure 65). It is also considered a ‘body building food’ good for growth in children.

Figure 65. Rating of the animal source foods, in terms of taste in Mukono and Kamuli districts (n = 10).



Although pork was considered tasty by the respondents, they indicated that it might cause heart disease, especially if the fat layer is too thick. Hence it is not considered to be among the most nutritious and healthy foods (Figure 66).

Figure 66. Rating of the animal source foods in terms of nutrition/health in Kamuli and Mukono districts.

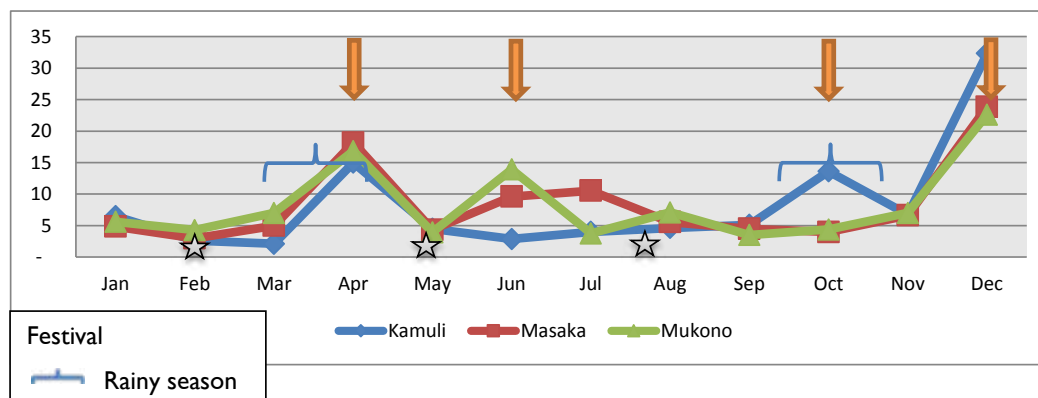


Pork is listed as ‘red meat’ by the United States Department of Agriculture, as a good source of vitamin C, niacin, phosphorus and zinc and a very good source of protein, vitamin B12, iron and selenium (USDA 2013). Nevertheless, it contains cholesterol, vitamin D and bile. Consumed excessively, cholesterol is associated with an increased occurrence of cardiovascular (heart) disease.

Role of pork in the diet, by season

The seasonal calendar was used in each of the villages to assess drivers of pork consumption. Figure 67 shows that consumption is highest in December and April, mainly associated with Christian festivities of Christmas and Easter.

Figure 67. Seasonality of pork consumption, by district.



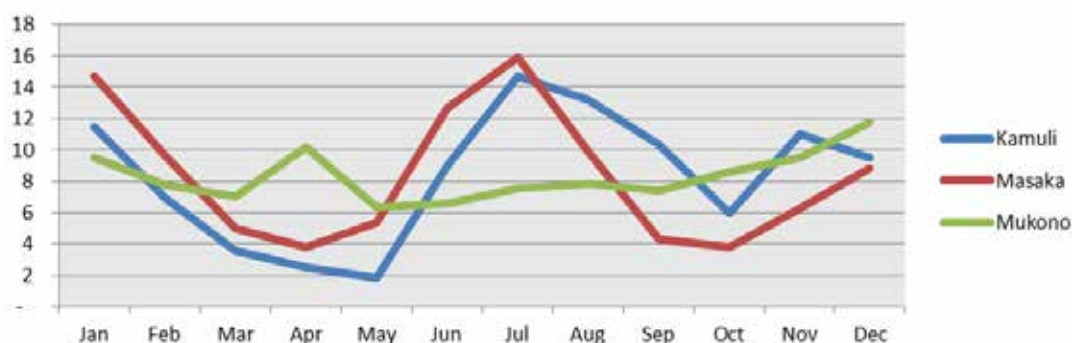
Other consumption peaks are associated with various festivities, depending on location. For instance, the Uganda martyrs’ day on June 3 is a big event which results in significantly huge consumption of pork as groups of Christians gather at the martyrs’ shrine in Wakiso district which borders Mukono. Pig farmers in Mukono usually take advantage of this market opportunity. The October peak, especially in Kamuli, is associated with independence day celebrations. Consumption of pork in Masaka shows a small plateau during the months of June and July when, according to respondents, there is income from the coffee harvest. During the same period (dry season), there is fear of swine

disease outbreaks which results in increased sales and home slaughter, especially in Masaka district. Less pork is consumed around the beginning of the new school terms (February, May and August) when pigs are sold to generate money for school fees.

Seasonal patterns of food availability

Food is generally considered to be plentiful during the months of June–August and in December and January, which coincides with crop harvesting periods (Figure 68). In Mukono, food supply appears to be relatively stable with peaks during April and December. Periods of food scarcity are between March –May and Sept–Oct, coinciding with the rains.

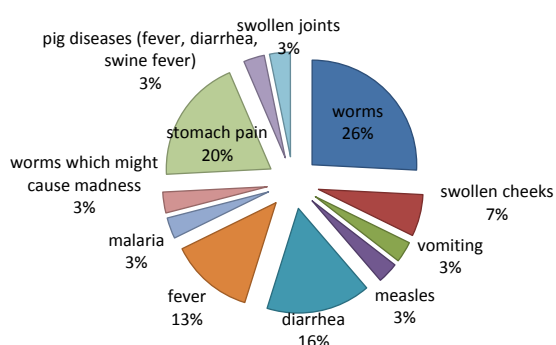
Figure 68. Seasonality of food availability and crop harvesting periods.



Knowledge, attitudes and practices associated with pork safety

Generally, all parts of the pig except the intestines are consumed. Occasionally, there are taboos and beliefs based on religion or societal norms that prevent individuals or groups from eating pork or certain parts of the pig. In all the villages, pig farmers agreed that it is possible to contract disease from eating pig. The most common are worms (26%), stomach pain (20%), diarrhoea (16%) and fever (13%)—see Figure 69.

Figure 69. Diseases caused from eating pork (n = 24).



The term ‘malaria’ is often used to refer to fever and if recurrent and in combination with joint pain; the underlying cause could be an infection with brucellosis or other (chronic) bacterial diseases. Worm infections can cause diarrhoea, vomiting and cheek swelling. Contrary to beliefs, the tapeworm larvae ingested through undercooked pork do not develop into brain cysts causing madness. Instead, ingested larvae develop into adult tape worms in the human intestines which shed eggs into the environment. Nevertheless, cysts in the brain are caused by the same tape worm species but not by ingesting larvae from undercooked pork but by ingesting tape worm eggs that had been picked up from the environment. The cause of tapeworm cysts in people is thus rather caused by poor sanitation, such as people not using latrines and lack of hand washing facilities. This context is often misunderstood by consumers and even technical staff, such as extension workers and meat inspectors.

Approximately 50% of the pig farmers had heard about foodborne diseases in their community, and 31% of them indicated that children were most affected. None of the respondents said that foodborne diseases can result in death, but all agreed that it seriously weakens the person affected and hence his or her ability to work or concentrate at school. The usual practice in homes is for pork to be thoroughly cooked for at least one hour. Furthermore, modest attempts are made to preserve the shelf-life of raw pork, for instance by smoking and roasting. When eaten outside of the home, fried or roasted meat is usually consumed with raw vegetables such as tomato, cabbage and onion. Unhygienic handling of the raw vegetables during preparation may result in cross-contamination.

Pork is often served with raw vegetables which when handled unhygienically can lead to cross-contamination.



Credit: ILR/Danilo Pezo.

Discussion and synthesis

Products

In general, the study reveals that pig farmers mainly produce i) piglets for sale, ii) pigs for slaughter after being fattened. Some engage in both.

In the urban–urban domain, growing and fattening pigs for slaughter is generally more dominant than producing piglets for sale. This could be attributed to the relatively higher presence of markets and potential buyers of pork in these areas which stimulate production by pig producers. In the rural–urban domain, farmers engaged in producing both are in the majority and this could be attributed to the fact that farmers tend to target both opportunities due to their location (i.e. pork sales in urban areas and piglet sales in rural areas). They tend to spread their chances by engaging in producing both products.

In the rural–rural domain, production of pigs for fattening and slaughter and production of piglets for sale were both quite important. Production of pigs for fattening is attributed to the low cost of feeding, since there is still some land where free range can be practiced where water is also quite available for free. Production of piglets for sale could also be stimulated by the numerous buyers within the villages who wish to join the enterprise, as well as by government programs, such as NAADS which purchase piglets for distribution amongst farmers as start-up assets in the ‘prosperity for all’ program of the government.

Seasonality

Pig rearing is greatly affected by seasonal changes of rainfall patterns and findings from the study clearly indicate that income of pig farmers is highest during the dry periods, May–July and November–December. These periods also coincide with festivities, such as Christmas and martyrs’ day, leading to high demand for pork. At the onset of the dry season, farmers are usually harvesting their crops and due to limitations in their capacity to process and store, most sell immediately at whatever price is offered. This implies that at such times, farmers possess some disposable income which may be used to purchase pork for domestic consumption or even for consumption in bars, restaurants or pubs. Lots of pigs are slaughtered to target such income and results from this study reveal that consumption of pork tends to be high in the dry seasons. Another reason for the availability of pork in the dry seasons is the increase in ASF, especially during the dry seasons which cause farmers to destock for fear of losing their pigs.

Expenditure patterns of pig farmers are also seasonal in nature and findings show that peaks occur at the beginning of February, May, August and December. These peaks coincide with the time when school terms begin, as well as the festive season in December. Pigs play an important role in meeting household school fees expenditures.

Production systems

Farmers in the urban–urban domain are mainly enticed by the market opportunities close to them, hence they adopt intensive systems where space is limited. Institutions such as NAADS have also promoted intensive pig production systems in urban settings. In such systems, farmers confine animals in corrals and they feed them with leftovers, peelings and crop residues which are sourced from food markets, schools, hotels and restaurants.

In the rural–urban domain, farmers tend to move away from intensive systems to semi-intensive systems which are less capital intensive. In such a system, pigs may be tethered to a tree under a shade in the compound or in the bush near the compound and moved from tree to tree for shade or change of diet. Feeds often comprise crop residues or grass. This system is quite suitable for this domain given that land is less scarce than in the urban–urban domain and crop residues and forages, as well as peels and leftovers, are available for feeding. Farmers in this domain usually have relatively more space compared to those in urban–urban and hence this system works best for them.

In the rural–rural domain, production of pigs for fattening and slaughter appeared to be dominant and this could be attributed to farmers in such areas having more opportunities to practice extensive pig rearing where animals scavenge on existing rangelands and drink from the available water sources. For resource-poor farmers, this production system works best for them since it is less capital intensive. Furthermore, the feeding burden in such a domain could be lessened by the readily available crop residues and fodder which can be fed to pigs. However, all this is quite threatened by the increasing pressure on land due to population growth which causes land fragmentation, thereby making extensive pig rearing more difficult to practice.

Input and output supply channels

Input supply

For input supply, specifically delivery of extension services, credit, feeds, animal health and breeding services, the following were observed.

Extension services: NAADS was less prominent in the rural–rural domain yet one should have expected otherwise. On the contrary, a heavier presence of NAADS is observed in the rural–urban and urban–urban domains. It is probable that extension services are mostly rendered where farmers are more organized and linked to market opportunities so they attach great importance to services which support them. However, NGOs complement extension service delivery and results show that women participate more in NGO activities especially in the rural–urban and urban–urban domains. This may be explained by the fact that NGOs tend to be gender sensitive and hence when implementing their extension service delivery, women are specifically targeted.

Financial credit: SACCOs take the lead as main suppliers, followed by MFIs, banks and VSLAs. Deliberate efforts have been made by government to support SACCOs with seed funding so that farming populations may be targeted with credit. Although MFIs also play a significant role in credit provision, the interest rates charged on loans are often quite high though they offer easy and quick access to credit. Survey results indicate that MFI credit is most common in rural–urban and urban–urban domains where farmers are more linked to markets. Banks also offer credit to farmers especially those belonging to these two domains. However, it is interesting to note that despite Mukono town reporting the highest number of banks, results show that none of the farmers from this sub-county acquired credit from banks. This may imply that often, the conditions and procedures for access credit from banks may intimidate smallholder farmers who then shy away and resort to seeking funds from less stringent sources. VSLAs were more prominent credit sources in rural–urban domain, whereas women groups were more prominent credit sources in the rural–rural and urban–urban. Such sources are usually aimed to targeting certain groups and they are usually supported by some agencies with some specific interests.

Animal health services: Animal health service providers mainly comprise veterinarians, para-veterinarians who are mainly private practitioners and NAADS which is a government agency. In general, the private sector dominates the provision of such services and this is as a result of government privatization of veterinary service provision, as well as imposing a recruitment ban on veterinarians to the civil service. Some veterinarians joined NAADS as coordinators and provide such services privately, though primarily the services are currently in the hands of private practitioners.

Breeding services: Most farmers in all the domains obtained breeding services for their pigs from village boars that are owned by other farmers within their villages. This is attributed to the fact that most farmers cannot afford to keep their own breeding boars and other options such as artificial insemination are not yet well developed for pigs.

Feeds: Feed millers are the main sources of feed in all three domains. Farmers tend to purchase maize bran to which they add some other ingredients such as concentrates. This has become a more affordable way of accessing feeds for pigs. Some farmers may purchase feeds (already mixed following some formula) from feed shops. This is mainly done by farmers who have specific market targets to meet and hence they believe feeds from such outlets would give them the required growth rates.

Output supply

Four main channels were identified for sale of pigs by farmers. These include i) direct sales to consumers, ii) neighbourhood butchers, iii) butchers in nearby towns and iv) traders. Sales to neighbourhood butchers were the most common channel for farmers in all three domains and this may be due to location convenience and lack of alternative outlets. Some farmers in the urban–urban value chain sold to nearby towns, where the price was better than for the neighbourhood butchers.

Piglet sales were mostly to other farmers within the village or in neighbouring villages. Agencies such as NAADS were key buyers especially in rural–rural domain. Absence of livestock markets and abattoirs dictated that animals were mostly sourced from the premises of the farmers.

Constraints, opportunities and interventions

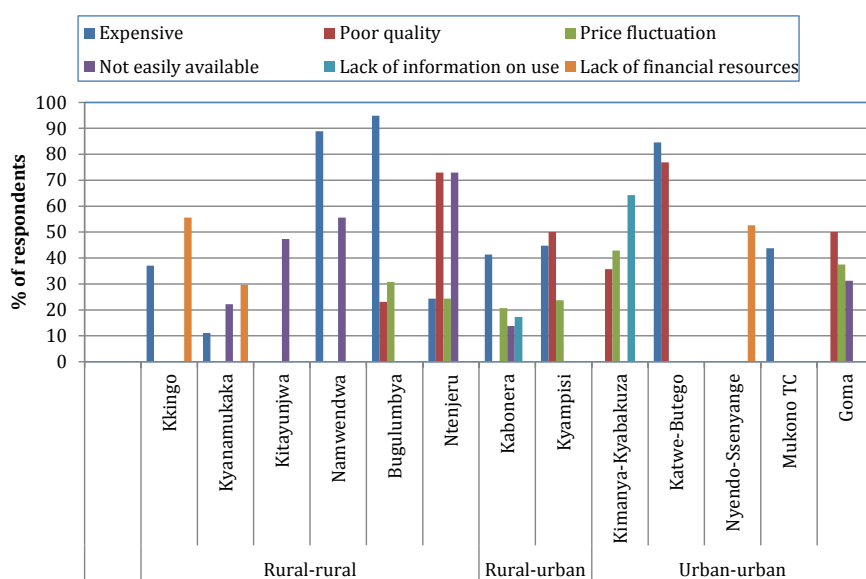
A major objective of the value-chain assessment was to identify constraints and opportunities associated with various components of the smallholder pig value chain in order to identify potential interventions for overcoming the constraints. Each focus group discussion session covering a specific domain identified constraints and opportunities associated with it. The discussion results were then presented in a plenary session for further input from the participants.

Constraints and opportunities

Constraints associated with inputs and services

Approximately 70% of the respondents claimed that the low availability of inputs and services was the most notable constraint, whereas about 90% of the respondents claimed that inputs and services were costly. In some of the value chains, the poor quality of inputs was also a limiting constraint. In the rural–urban and urban–urban value chains, poor quality of the inputs was mentioned by a relatively high number of respondents, although in Ntenjeru sub-county (rural–rural value chain), over 70% of respondents also indicated this constraint. Price fluctuations were a common constraint in the rural–urban and urban–urban value chains (Figure 70).

Figure 70. Constraints on inputs and service.



Some of the constraints mentioned in regards to inputs and services are in Table 33. The most reported constraints in regards to feeds were high cost (especially for maize bran) and poor quality. Due to seasonal availability of maize, bran tends to be scarce and expensive during dry seasons. The quality of animal health products, as well as animal health service providers, were also indicated as limiting factors. Farmers indicated that most of the animal health service providers were either not professional or the drugs used for treatment were not effective. Regarding credit facilities, high interest rates associated with loans was the most reported constraint.

Table 33. Principal constraints for input or service provision (n = 308)

Input type	Constraint	No. of respondents reporting	Respondents reporting/total (%)
Animal health products	Counterfeit products	20	6
	Knowledge on how to use	7	2
	Unavailability of products	7	2
	Price fluctuations	5	2
Animal health service providers	Expensive	12	4
	Poor quality of work	49	16
	Few providers	17	5
Breeding services (village boars)	Transmit diseases	4	1
	Far (long distance to reach village boar)	12	4
Credit facilities	Poor quality	6	2
	Lack of information on credit facilities	15	5
	High interest rates on loans	24	8
Extension	Poor access to extension service (few extensionists)	15	5
Feeds	Expensive	77	25
	Poor quality	51	16

Pig farmers were asked specific questions on what prevented them from using more and better quality inputs. Major constraints associated with the use of more inputs were unavailability of inputs, lack of financial resources to purchase more and low prices of outputs (live pigs) vis-à-vis the high prices of inputs.

Farmers also indicated why the use of better quality inputs was limited (Table 34). Lack of knowledge on better quality inputs was indicated as one of the reasons by a relatively high proportion of farmers in the rural–rural and rural–urban domains (up to 30%). Some of the specific issues included lack of knowledge on feed mixing to achieve good quality feeds and poor knowledge on quality standards for most inputs though they knew that some of the inputs were not effective. Good quality inputs were indicated as being expensive and farmers cited lack of finances to enable purchase of such inputs. This was especially common in the rural–rural and rural–urban value domains. A high proportion of farmers in the rural–rural domain also indicated unavailability of outlets selling high quality inputs as a major barrier to use of good quality inputs. This was also a common constraint in the urban–urban domains in Mukono district but not Masaka.

Table 34. Constraints associated with use of better quality inputs

Value-chain domain	Sub-county	Constraints on use of better quality inputs (% of respondents)				n
		Lack of knowledge	Limited finances	No outlets selling quality inputs	Saving on costs	
Rural–rural	Kkingo	0	5	27	16	27
	Kyanamukaka	11	8	0	0	27
	Kitayunjwa	11	9	0	0	19
	Namwendwa	0	8	16	0	18
	Bugulumbya	30	18	34	0	39
	Ntenjeru	0	13	0	24	37
Rural–urban	Kabonera	15	11	0	0	29
	Kyampisi	7	13	0	29	38
Urban–urban	Kimanya-Kyabakuza	15	3	0	32	14
	Katwe-Butego	0	6	0	0	13
	Nyendo-Ssenyange	11	0	0	0	19
	Mukono town	0	4	11	0	16
	Goma	0	2	13	0	16
Total		100	100	100	100	312

Constraints associated with product sales

The common constraints associated with product sales were limited market opportunities, lack of capacity to estimate pig live-weight, low prices, and lack of market information (Figure 71).

Figure 71. Constraints on product sales.

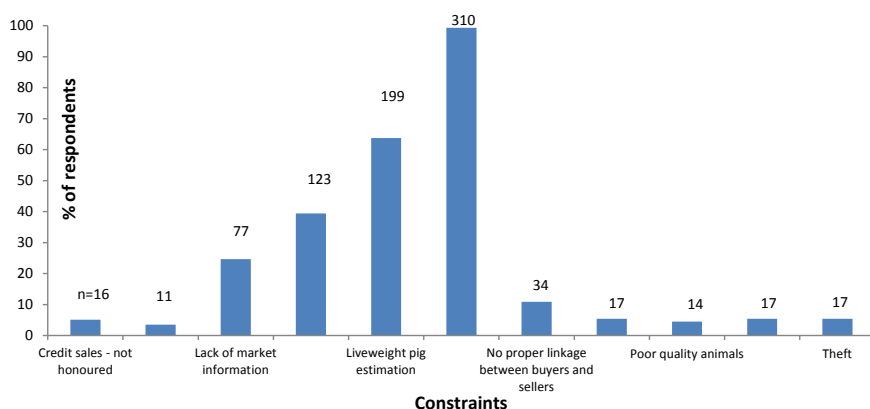


Table 35 shows the specific constraints of product sales based on farmers' localities and value-chain domains. Limited market opportunities were mentioned as a constraint by a relatively high proportion of farmers from the rural–rural (8–24%) and rural–urban (17%) value chains compared to the urban–urban value chains. They indicated that within their localities there were few buyers for their pigs and piglets. Besides, these local buyers do not offer competitive prices to farmers. Furthermore, most pig farmers within a locality sell their pigs to the same buyers leading to a glut in the pig market especially a few weeks before re-opening of schools thereby further depressing the market prices.

Table 35. Principal constraints associated with product sales

Value-chain domain	Sub-county	Constraints associated with pig and piglet sales (% of respondents)					n
		Lack of market information	Limited market opportunities	Lack of capacity to estimate pig live-weight	Low prices	Poor seller–buyer linkages	
Rural–rural	Kkingo	0	8	10	10	0	27
	Kyanamukaka	0	11	10	5	0	27
	Kitayunjwa	22	8	0	7	0	19
	Namwendwa	0	15	6	3	0	18
	Bugulumbya	16	24	5	16	0	39
	Ntenjeru	0	7	22	16	21	37
Rural–urban	Kabonera	0	0	12	11	24	29
	Kyampisi	26	17	20	14	0	38
Urban–urban	Kimanya-Kyabakuza	5	0	0	2	12	14
	Katwe-Butego	8	0	8	5	0	13
	Nyendo-Ssenyange	13	0	0	4	21	19
	Mukono town	10	0	7	7	0	16
	Goma	0	10	0	0	24	16
Total		100	100	100	100	100	312

A common constraint mentioned by farmers in all domains was the lack of capacity to estimate pig live-weight (up to 22% of respondents). Consequently, farmers were underpaid since the buyers tended to take advantage of this weakness by underestimating the weight of pigs. Low price of pigs was also linked to sale of sick animals, while for piglets it was associated with inferior breeds. Lack of market information especially on prices, alternative market outlets and consumer preferences were indicated by respondents in most sub-counties of the urban–urban domain as a key constraint. It was also a constraint in some of the rural–rural and rural–urban value chains, such as in Kitayunjwa, Kyampisi and Bugulumbya sub-counties. Poor seller–buyer linkages were a constraint commonly indicated in the urban–urban value chains. The farmers also indicated slow growth in sales volume, due to lack of capacity in terms of feed resources, finances and breeds.

Hindrances to getting good prices were also investigated (Table 36). Some of the constraints, such as lack of capacity to estimate the weight, lack of market information and limited markets, were already identified under general constraints associated with product sales. Most respondents reared pigs to be able to pay for financial costs, especially school fees. Some farmers exhibited a tendency to accept any price offered in order to meet their immediate financial obligations. Farmers' low bargaining power due to not being organized was a constraint mentioned in a number of sub-counties in all the value-chain domains. Most of those who mentioned this constraint were from Mukono town.

Table 36. Constraints associated with obtaining better output prices

Value-chain domain	Sub-county	Constraints to achieving better output price (% of respondents)								n
		Lack of capacity to estimate pig live-weight	Emergency sales	Lack of price and general market information	Limited market	Low bargaining power due to lack of organization	Lack of regulations on pig marketing	Poor quality pigs	Traders operate as cartels and collude in setting prices	
Rural–rural	Kkingo	8	7	33	0	0	0	0	0	27
	Kyanamukaka	19	0	0	15	9	0	7	12	27
	Kitayunjwa	20	0	0	9	12	0	10	0	19
	Namwendwa	8	19	0	15	0	0	8	0	18
	Bugulumbya	32	0	0	18	13	0	22	0	39
	Ntenjeru	0	0	23	23	12	0	7	0	37
Rural–urban	Kabonera	13	16	10	0	0	0	5	32	29
	Kyampisi	0	18	11	7	12	0	16	15	38
Urban–urban	Kimanya-Kyabakuza	0	13	13	7	9	0	16	9	14
	Katwe-Butego	0	0	11	0	0	100	0	0	13
	Nyendo-Ssenyange	0	11	0	0	13	0	0	0	19
	Mukono town	0	7	0	6	20	0	0	21	16
	Goma	0	9	0	0	0	0	9	11	16
Total		100	100	100	100	100	100	100	100	312

A common constraint mentioned as hindering farmers from obtaining better prices was sale of poor quality pigs due to poor performing breeds, poor feeding and lack of proper management. This was a constraint especially in the rural–rural (7–22% of respondents) and rural–urban (5–16% of respondents) value chains. In some of the sub-counties, farmers mentioned that traders operated cartels which colluded in setting prices, thereby hindering them from negotiating for better prices. Those ascribing to this constraint were largely from the rural–urban (15–32%) and urban–urban (9–21%) value-chain domains.

Constraints that hinder farmers from achieving better quality pigs or piglets are presented in Table 37. Lack of capacity on what can be done to achieve good quality pigs was commonly mentioned by farmers across all value-chain domains. In the rural–rural and rural–urban domains, a relatively high proportion of farmers (9–22%) indicated that they could not afford quality inputs to enable production of quality pigs. Poor breeds were a common constraint in Kyampisi (35% of respondents), Bugulumbya, Ntenjeru, Goma and Katwe-Butego (12–18% of respondents). Some of the farmers in some of the sub-counties across the different value chains (Bugulumbya, Ntenjeru, Kabonera, Katwe-Butego) indicated that they fed their pigs on poor quality feeds and thereby could not obtain high quality pigs. Poor pig health and lack of drugs were common constraints in Kkingo, Namwendwa (rural–rural value chains) and Kimanya-Kyabakuza (urban–urban value chain). Generally, poor management practices, especially in regards to housing, were a key constraint especially in Kyampisi.

Table 37. Constraints associated with achieving better quality output

Value-chain domain	Sub-county	Constraints associated with achieving better quality output (% of respondents)						n
		Lack of capacity	Lack of finances for inputs	Poor breeds	Poor feeds	Poor health and lack of drugs	Poor management	
Rural–rural	Kkingo	12	17	0	0	43	0	27
	Kyanamukaka	17	18	0	6	0	0	27
	Kitayunjwa	11	10	0	8	0	0	19
	Namwendwa	0	10	0	7	35	0	18
	Bugulumbya	0	22	18	15	0	0	39
	Ntenjeru	0	0	15	25	0	16	37
Rural–urban	Kabonera	25	9	0	17	0	15	29
	Kyampisi	0	0	35	0	0	45	38
Urban–urban	Kimanya-Kyabakuza	0	7	0	0	22	9	14
	Katwe-Butego	17	0	18	14	0	0	13
	Nyendo-Ssenyange	12	0	0	0	0	0	19
	Mukono town	0	8	0	7	0	0	16
	Goma	7	0	12	0	0	15	16
Total		100	100	100	100	100	100	312

Constraints on feeds and feeding

Constraints and potential solutions for feeds and feeding depend on the feed sources used. The high cost of commercial feeds, seasonal variation in cost of ingredients, low quality of commercial feeds and ingredients were some of the main constraints mentioned by farmers (Table 38). The low quality of commercial feeds is associated with inadequate knowledge on feed formulation by feed stockists, whereas low quality ingredients are mainly due to adulteration and farmers refer to the product as 'fake feeds'. Farmers also expressed interest in receiving training on how to formulate home-mixed feeds, though this should also apply to feed stockists. In regards to forages, the main constraints were scarcity during the dry season and infestation with parasites. In order to tackle the constraints, some of the options mentioned were training in feed conservation, fertilization of pastures, use of alternative feeds during periods of limited growth of forages, and regular deworming of pigs.

Table 38. Farmers' perception on constraints and potential solutions in using different types of feeds in Kamuli, Masaka and Mukono districts

Feed type	Constraints	Potential solutions
Commercial feeds	Expensive Poor quality feeds	Training on feed formulation Quality control of feeds Produce enough feeds at farm level Farmer groups organized to negotiate with feed stockists
Home mixed rations	Lack of knowledge on proper rationing Poor quality of ingredients Seasonal variation in availability/cost of ingredients	Training on feed formulation Purchase feed ingredients in periods when prices are low Buy ingredients from reliable sources
Natural/planted forages	Scarce during dry season Infestation with parasites	Training on feed conservation Fertilize pastures Use of alternative feeds, i.e., other fodders, maize bran
Crop residues	Seasonal availability	Training on feed conservation Buy commercial feeds or prepare home mixes
Kitchen leftovers	Presence of harmful objects (broken glasses, bones, plastics), particularly when leftovers come from restaurants. Potential source of diseases (e.g. ASF)	Check and sort the feeds before feeding to pigs Cook the swirls to eliminate pathogens Produce enough feeds

For crop residues, availability is very much dependent on the cropping calendar, particularly those consumed green because silage conservation is an unknown practice for farmers in different settings. In all districts, farmers identified the need for training on conservation techniques for crop residues and forages.

Kitchen leftovers are frequently used for pig feeding. In peri-urban settings, kitchen leftovers from restaurants, school cafeterias and hotels are the most common. From these sources, farmers identified the presence of harmful objects (glass, plastic bags) as an important risk for feeding pigs, and the solution identified in those cases is to check carefully the residues before feeding the pigs. Another risk is the introduction of pathogens from the kitchen leftovers fed to animals, many farmers referred to it as a means of spreading the virus responsible for AFS. The solution identified for the constraint is to cook the kitchen leftovers before feeding to pigs. Some farmers also indicated that producing enough feeds in the farm would be another solution, since that way smallholder pig producers would not depend on the use of kitchen leftovers.

Constraints on breeds and breeding management

The main constraints to breeding, as reported by the groups, are depicted in Table 39. The named constraints tended focus on aspects of reproduction (abortion), piglet survival (lactating sows lack milk, sows eat piglets, sows sleep on piglets), or herd health (diseases). Other constraints included lack of transport to take sows to boars (five groups), lack of boars (two groups), and lack of capital for servicing sows (two groups). All constraints were associated with lack of information and knowledge. Additionally, sows eating or sleeping on piglets was considered by some groups to be associated with limited land or space for rearing pigs.

Table 39. Key constraints to breeding

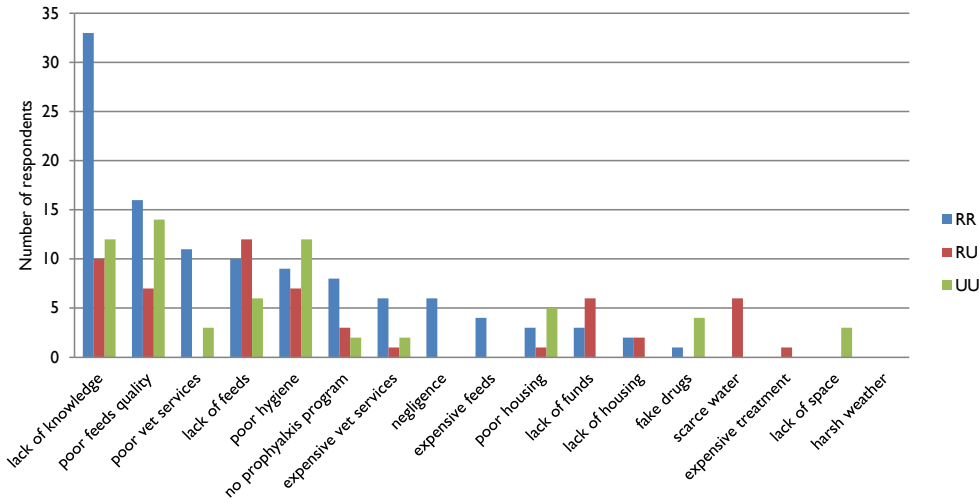
Constraint	Rural to rural (n = 18 groups total)	Rural to urban (n = 7 groups total)	Urban to urban (n = 10 groups total)	Total groups (n = 35 groups total)
Lactating sow lacks milk	14	7	3	24
Sow eats piglets after farrowing	9	5	5	19
Disease (not specified further)	7	3	6	16
Sow sleeps on piglets	5	2	3	10
Abortion	3	2	4	9

I. Given are the principal five constraints based on number of groups reporting, n = No. of groups.

Constraints on pig health and management

The main constraints related to animal health as identified by the farmers are poor housing, poor feeding, lack of knowledge on management practices, health-delivery and drug related constraints. Housing constraints were common in rural areas as well as lack of knowledge and feeds. Feeds quality is poor and commercial feed is expensive (Figure 72).

Figure 72. Constraints related to pig health and management practices.

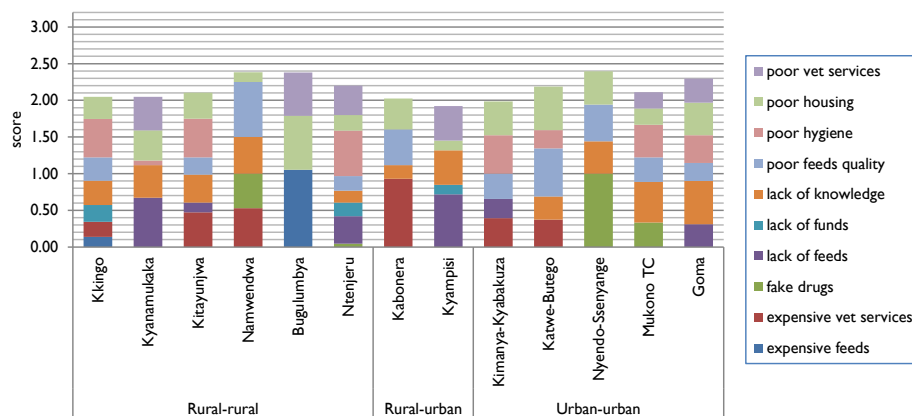


A major concern raised by farmers was the poor quality of health services. A lot of practitioners are para-veterinarians with certificate training in animal husbandry, while others are private practitioners without any training and are often not registered. Some of the practitioners are not qualified to handle animal health problems, thereby exposing farmers to substandard service provision and inadequate follow-up on pigs during treatment. Frequently, drugs such as antibiotics are given as a single dosage without completion of the required full course. This leads to subsequent multiple dosages for eventual treatment of infections, hence making it more costly to farmers. Worse, some practitioners take advantage of farmers by misinforming them about treatment regimens, especially in regards to ASF. Often, technical assistance from public veterinary services is unavailable and there is limited access to drugs. In addition, there is no routine prophylaxis program for pigs.

Lack of knowledge is the key constraint dominating husbandry practices and management. Some farmers engage in pig production because they believe that pigs are easy to rear and only few labour and capital resources are required. Farmers, therefore, do not often seek technical advice because they consider the cost of the services to be high. Some NGOs (like VECDO) and government institutions (NAADS) provide technical advice on pig rearing during the implementation of their activities in some selected sub-counties. However, few farmers have access to such services as they are based on specific programs that are implemented for a limited period of time. Basic knowledge and application of piggery management is required by the farmers to enhance pig productivity.

A weighted score of the constraints was obtained based on the number of farmers reporting the constraints and the total number of farmers in the focus groups (Figure 73).

Figure 73. Weighted score of constraints, by value-chain type.



Notable are the high scores on poor feed quality, expensive feeds, expensive veterinary services and ‘fake drugs’ in some of the sub-counties. Farmers also constructed a constraint-opportunity matrix (see Annex 13).

Potential interventions

Various sources were used to identify potential best-bet interventions for the Uganda pig value chain:

- Farmers participating in the value-chain assessment focus group discussions were asked to identify some potential solutions to the identified constraints.
- An evaluation was done on the successes and failures of technological and institutional best-bets from various countries for the pig value chain, in order to learn from past interventions.
- A stakeholder workshop was held in April 2013 where the results from the value-chain assessment work were presented and some potential best-best for improving the pig value chain were proposed.

This section presents some of the proposed best-bets from these sources. More discussions with partners are ongoing to identify and validate best-bets.

Table 40. Potential best-bets for pig health and management

Issues	What is it related to?	Actors	Interventions	Outcome	Activities
Limited knowledge on biosecurity measures	Sharing of village boars	Farmers	Education package for different actors including : biosecurity knowledge and pig disease information	Reduced spread of disease	Longitudinal RCT: Knowledge, attitudes and practice (KAP) intervention
	Selling diseased pigs during ASF outbreaks	Traders			
	Consuming sick pigs at home	Consumers	Increase awareness of consumers on impact of pig meat born disease	Increased pig productivity	Training package (manual/leaflets/poster)
	Scavenging practices	Processors/ abattoirs/ slaughter areas		Increased income	
	Feeding with swill			Reduced public health risks	
	Uncontrolled inter-farm visits		Promote housing model with three-stage enclosure (Kraal) with footbaths		Test kraal model
	Poor hygiene at farms and slaughter places				
Spread of diseases from farm to farm			(Short term)		
Lack of knowledge on good husbandry practices	No deworming regime	Farmers	Training on good husbandry practices	Improved health	Training package (manual on good husbandry practices)
	No prophylaxis program	Local government	Promote confinement		
Poor drug management	Misuse of drugs	MAAIF	Provide evidence of negative consequences of the misuse of veterinary products	Healthier pigs	Training on drug use and management
	Poor drug handling	Veterinary officers			
	Fake health workers	Local government	Sensitize actors on consequence of low quality drugs	Better use of drugs	Testing of improved model of pig health delivery and management
	Fake drugs	Drug stockists			
		Animal health workers			
		(Short term)			
Poor confinement types	Poor housing (lack of space, poor hygiene)	Farmers	Promote housing model with 3-stages enclosure (Kraal)	Increased productivity	Test a housing and improved tethering models
	Harsh weather	MAAIF			
	Poor tethering methods	Veterinary Officers	Improved tethering model		
Absence of vaccine for ASF	Increased outbreaks of ASF	ILRI	Develop a vaccine with the following properties for ASF: thermostable, affordable, easy to administer, single dose, life lasting immunity	ASF vaccine affordable and easy to handle available to farmers for wider use	Boost vaccine research at ILRI and partners
	High mortality rates	Private sector			
	Loss of income from piggery				
			(Long term)		

Poor disease surveillance and poor implementation of policy regulations	Poor action from MAAIF after outbreak Veterinary Officers poorly equipped for rapid disease diagnostics Poor diagnostic and drug quality Poor inspection at slaughterhouse	MAAIF ILRI District veterinary officers	Rapid diagnostic tests (ASF/Cyst.) Central slaughter place at village level Increase capacities of MAAIF and local government to implement regulations Sensitize actors on consequence of low quality drugs (Medium-term)	Pig health improved	Set up a community surveillance system Rapid diagnostic tests for common pig diseases Test central slaughter at village model Design different models of delivery of information
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Table 41. Potential best-bets for pig value chain

Constraint, opportunity	Intervention, practice, technology	Description	Suitability using criteria developed	Timeframe
Lack of linkage among value-chain actors (including Financial services).	Facilitate the emergence of organizational models to enhance value-chain coordination Variants of collective action Check-off system Contractual arrangement Strengthening existing farmer/women groups to act as coordination units Facilitate linkages between organizational models and financing institutions	Establishment of collective action/ coordination units along the value chain that are context specific	Socio-cultural sustainability Commonality of interest; meet priority needs of the local areas Economic viability	Short/ medium term
Lack of market information, value addition strategies, business skills, input and service providers.	Capacity building for farmers and organizational model actors on: Governance Business skills (e.g. to enhance women's participation in the value chain) Husbandry practices, record keeping Quality assurance Standardization (weight estimation) etc. Value addition for pork by-products Credit access	Developing the capacity of various players along the value chain in order to improve the performance of the value chain, e.g.: equipping farmers with business skills to operate pig enterprises profitably; improving governance capacity of groups	Contributes to project vision of an efficient and self-sustaining value chain	Short/ medium term
Low priority of smallholder pig production in Uganda's national agenda, hence lack of targeted policy for the subsector.	Facilitate emergence of policy advocacy forum to influence policies favourable for smallholder pig value chain at district and national levels in Uganda.	Influencing government to play a more proactive role in promoting performance of pig industry, e.g. stimulate debate of handling and quality assurance, regulation of feed quality etc.	Improvement in institutional performance Minimize environmental externalities	Long term Long term

Conclusions

Constraints

Key constraints associated with smallholder pig production and marketing include:

- a) **Seasonality of feed supply and lack of capacity to develop nutritionally balanced feed rations:** Most smallholder pig producers rely mostly on natural pasture/forage species, crop residues and kitchen waste as the base diet for feeding their pigs. Poor pasture productivity, the seasonal nature of pasture and crop production, and prolonged drought periods in addition to the lack of forage conservation strategies are major limitations for the constant supply of forage for pigs. Results showed significant feed scarcity especially during the dry season (June–September) in the 3 districts. Although pasture/forage species and crop residues are seasonally available as pig feed, farmers generally lack capacity to develop nutritionally balanced least-cost rations and strategic supplementation of fodder-based diets.
- b) **High risks associated with swill feeding for pigs:** Kitchen leftovers are frequently used for pig feeding. In peri-urban value chains, kitchen leftovers from restaurants, school cafeterias and hotels are the most common. From these sources, farmers identified the presence of harmful objects (glass, plastic bags) as an important risk for feeding pigs. These sources were also identified as potential transmission avenues for African swine fever.
- c) **Poor husbandry practices and high mortality rates from diseases such as African swine fever (ASF):** In terms of management, the main constraints were poor housing and lack of knowledge on good management practices. ASF was highest ranked by farmers as the disease that causes high mortality in pigs. This ranking of disease was based on farmer perceptions. A critical additional area was the presence of co-infestations with other porcine pathogens, including ectoparasites and helminths which were identified by farmers as endemic in pigs in Uganda.
- d) **Breeding:** constraints tended to focus on aspects of reproduction (i.e. abortion), piglet survival (i.e. lactating sows lacking milk, sows eating piglets, sows sleeping on piglets), or herd health (diseases).
- e) **Limited market opportunities:** Most farmers sell their pigs within their localities and usually to the same buyers who are few and do not offer good prices. Some farmers exhibited a tendency to accept any price offered in order to meet their immediate financial obligations. Traders operate cartels which collude in setting prices thereby hindering producers from negotiating for better prices due to their lack of organization into effective groups. In some of the peri-urban value chains where there are available markets, farmers still lack market information especially on prices and consumer preferences.
- f) **Poor quality of inputs (feeds and veterinary products) and high prices:** Most of the commercial feeds and veterinary products were regarded as being 'ineffective' and costly. The fluctuation in the cost of raw materials for feeds (especially maize) results in high variation in price of concentrates, which is passed on to

pig producers, and production of low quality feeds resulting from adulteration and lack of quality control.

Farmers indicated that most of the animal health service providers were either not professional or the drugs used for treatment were not effective as treated pigs failed to get well or died.

- g) Lack of financial resources to purchase inputs as well as low prices of outputs (live pigs) which tends to lower pig farmers' profit margins, thereby discouraging them from investing in inputs.
- h) There is weak coordination in the pig value chain with few actors engaged in some form of formal or informal contractual arrangements and organizations (NGOs, research, development projects) and line ministries of the central government playing limited supporting roles.
- i) Smallholder pig production is ranked low in Uganda's national agenda as contained in the Development Strategy and Investment Plan hence there is lack of a targeted policy for the subsector.

Recommendations

Based on the constraints outlined above, the following are some of interventions suggested for improvement of the pig subsector and more specifically the smallholder pig value chain.

To overcome constraints associated with input availability, affordability and quality, farmers are encouraged to foster collective action in input sourcing and purchase. This will lower the risks of adulteration and purchase of ineffective inputs and lower unit costs. Collective action requires that farmers join groups through which they purchase inputs and sell at better prices. The groups also facilitate access to support services such as extension, veterinary services and credit. However, farmers' capacities in group dynamics and management have to be built concurrently in order for this intervention to be effective.

To overcome sales constraints, farmers ought to have access to sufficient market information to make informed decisions on when, where, to whom and at what price they should sell their products profitably. Farmers' capacities to access and interpret market information have to be boosted.

- To address feed constraints, farmers' capacities in feed formulation and alternative feed resources should be built up so they can meet the feed requirements of animals year round and in a profitable manner. This may mean exploiting opportunities for fodder, crop residues and kitchen leftovers as feeds.
- To strengthen value-chain coordination, efforts to support and foster linkages among pig value-chain actors need to be reinforced. Producer organizations need to be strengthened while linking them to input suppliers as well as output markets or potential opportunities. Service providers (extension, credit, veterinary) as well as policy makers should be well integrated with the producer associations.
- Capacity building and training of farmers on best management practices and biosecurity measures for controlling ASF diseases is needed.
- A policy advocacy forum should be formulated to influence policies favourable to smallholder pig value-chain development at district and national levels.
- Efforts to develop a vaccine for ASF should be stepped up.
- Affordable rapid diagnostic tools for the most common diseases are also needed along with implementation of biosecurity measures along the value chain.

Further research needed

The following are the areas where further research is needed:

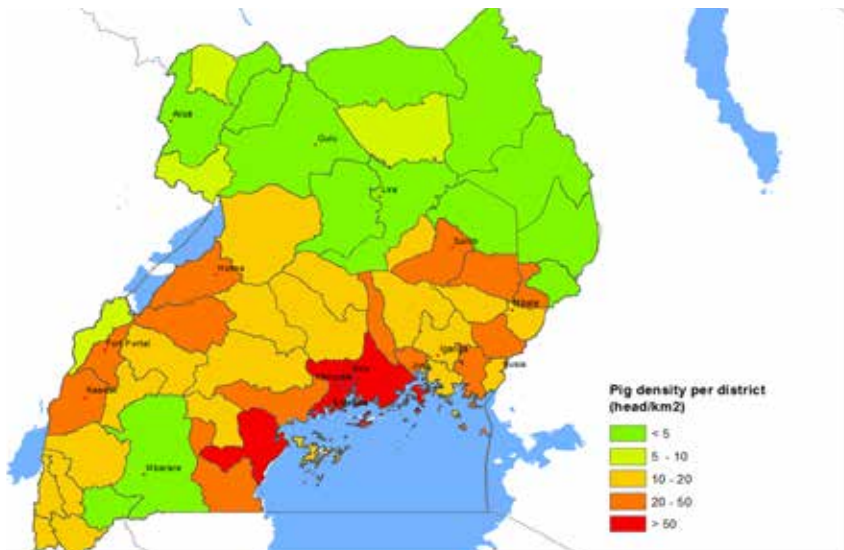
- Use of forages and crop residues as feed resources are still underexploited as they are currently only used after harvesting periods due to their perishability when not properly preserved as silage. Further research on their toxicity, processing and preservation may lead to an increase in their utilization as feed.
- Further investigation is required on the desirable traits of pigs (e.g. why floppy ears and short mouths are considered desirable).
- Efforts to develop a vaccine for ASF should be stepped up.
- Work is also need on the burden of globally important diseases apart from ASF. These include FMD disease, diarrhoea, porcine reproductive and respiratory syndromes (PRRS), and porcine coronavirus.
- It may be vital to assess the socio-economic impact of African swine fever along the value chain to quantify and highlight the associated losses.

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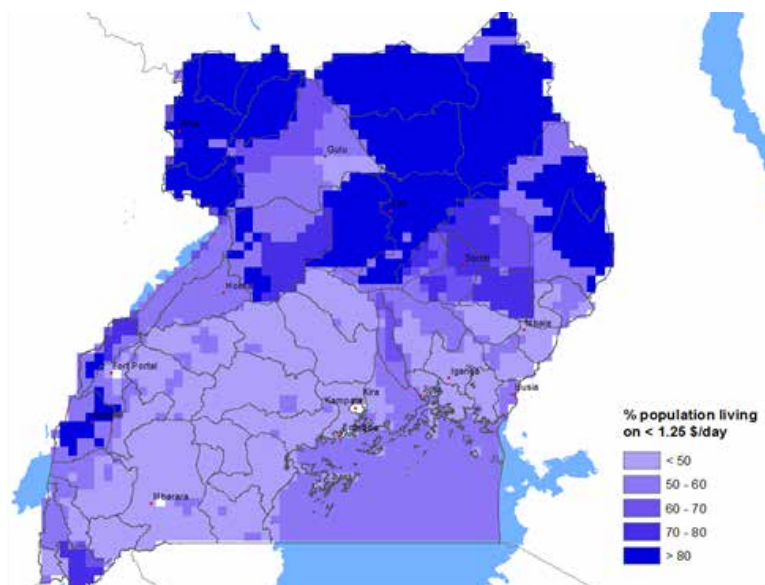
Annex I Spatial mappings of GIS variables

Pig population density in Uganda.



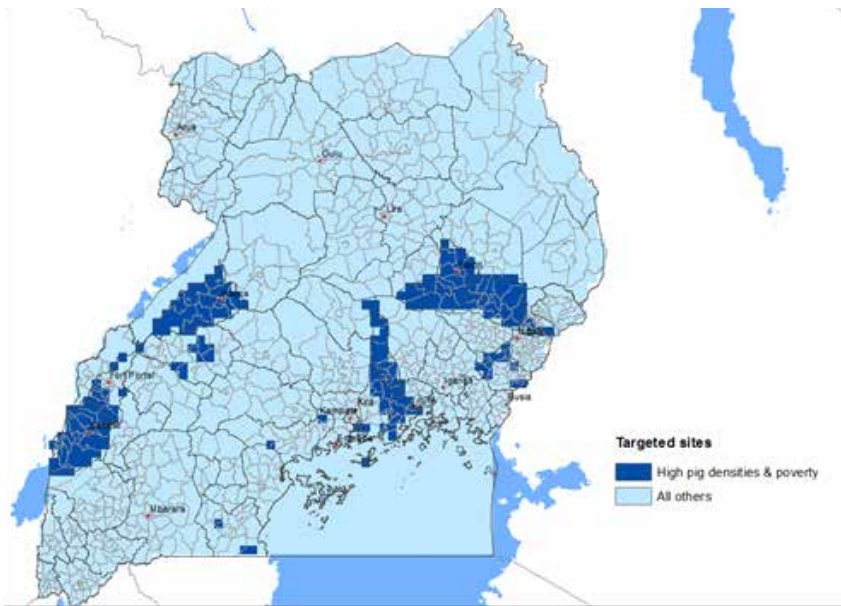
Source: van de Steeg et al. 2012—Uganda targeting report.

Poverty levels.



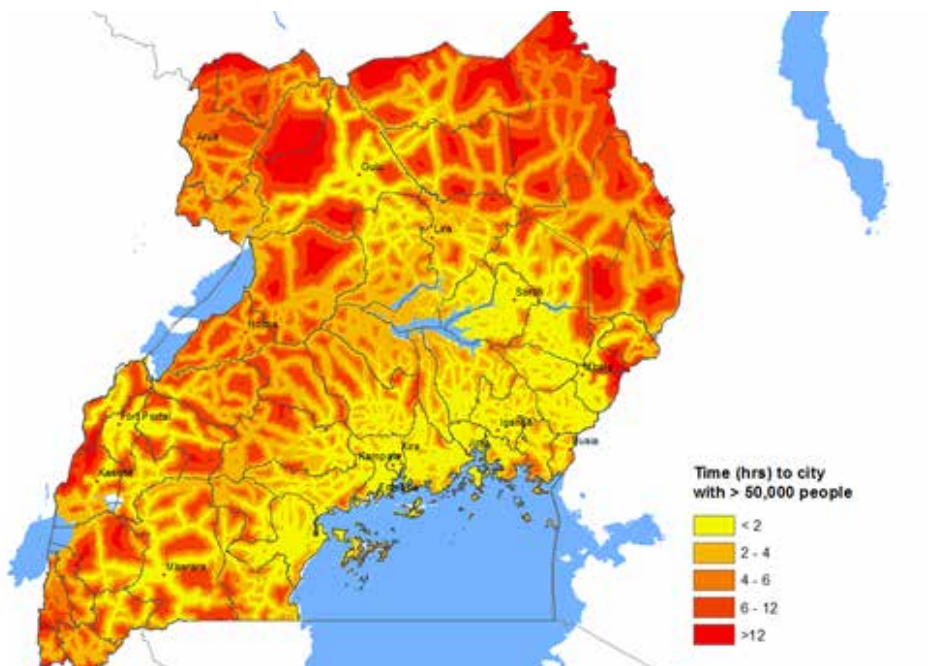
Source: van de Steeg et al. 2012—Uganda targeting report.

Potential sites for pig value-chain assessments based on GIS characterization.



Source: van de Steeg et al. 2012—Uganda targeting report.

Market access.



Source: van de Steeg et al. 2012—Uganda targeting report.

Annex 2 Potential districts for pig value-chain assessments based on GIS characterization

District	Region	Value-chain domain
Kayunga	Central	Rural–urban
Mukono	Central	Rural–urban/ Urban–urban
Bukedea	Eastern	Rural–Rural/ Rural–urban
Kumi	Eastern	Rural–Rural/ Rural–urban
Soroti	Eastern	Rural–urban/ Urban–urban
Tororo	Eastern	Rural–urban
Kasese	Western	Rural–rural/ Urban–urban
Hoima	Western	Rural–rural
Kibaale	Western	Rural–rural
Kabarole	Western	Urban–urban

Annex 3 Stakeholder participation in site selection process for pig value chain in Uganda

Site scoring exercise by stakeholders in Uganda.



Annex 4 Program for value-chain assessments with pig farmers in each village

	Group 1	Group 2	Group 3	Group 4
9.30–11.00am.	1. Objectives of pig keeping and description of pig production types	1. Objectives of pig keeping	1. Description of pig production types.	1. Objectives of pig keeping
	2. Seasonal calendar	2. Institutions (interactions and group membership)	2. Breed assessment	2. Food safety, nutrition and zoonoses
11.00–11.15am.	BREAK			
11.15am–1.00pm	3.VC mapping and marketing	3. Animal health	3. Feed assessment	4. Food safety, nutrition and zoonoses
1.00–2.00pm	LUNCH BREAK			
2.00–3.00pm	4. Plenary with discussion on the constraint—opportunity matrix from each domain in three above.			
	5. New group formation process			
	Group 1 (women only)	Group 2 (men only)	Group 3 (women only)	Group 4 (men only)
3.00–4.00pm	Activity clock	Activity clock	Decision making and livelihood matrix	Decision making and livelihood matrix
4.00– 4.15pm	Wrap up and closing remarks			

Annex 5 Labour requirements for cropping activities in a typical year

Maize—Kamuli district	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land preparation/ploughing	■											
Planting			■	■				■				
Weeding/thinning				■	■					■	■	
Harvesting	■						■	■				■

Sweetpotatoes—Kamuli district	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land preparation/ploughing				■				■				
Heaping mounds and planting vines				■	■				■	■		
Weeding					■					■	■	
Harvesting		■	■					■	■	■		

Beans—Kamuli district	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land preparation	■	■					■	■				
Planting		■	■					■	■			
Weeding/thinning			■	■					■	■		
Harvesting	■				■	■						■

Coffee—Kamuli district	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Digging holes in established fields			■	■								
Planting					■							
Weeding and deep ploughing						■	■			■		
Harvesting/picking cherries					■	■						

Maize—Masaka district	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land preparation and 1st ploughing	■											
Planting			■					■				
Weeding/thinning			■	■					■			
Harvesting		■					■	■				

Maize is intercropped with beans

Coffee—Masaka district	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seed bed preparation	■	■										
Dig holes		■										
Applying manure in holes		■										
Planting			■									
Erecting simple shedding on planted coffee			■									
Weeding			■	■	■				■	■	■	
Bending coffee branches (1 year after)			■	■								
Pruning								■				
Picking and drying coffee				■	■	■					■	
Marketing						■	■					■

Annex 6 Venn diagrams for depicting important institutions and interactions

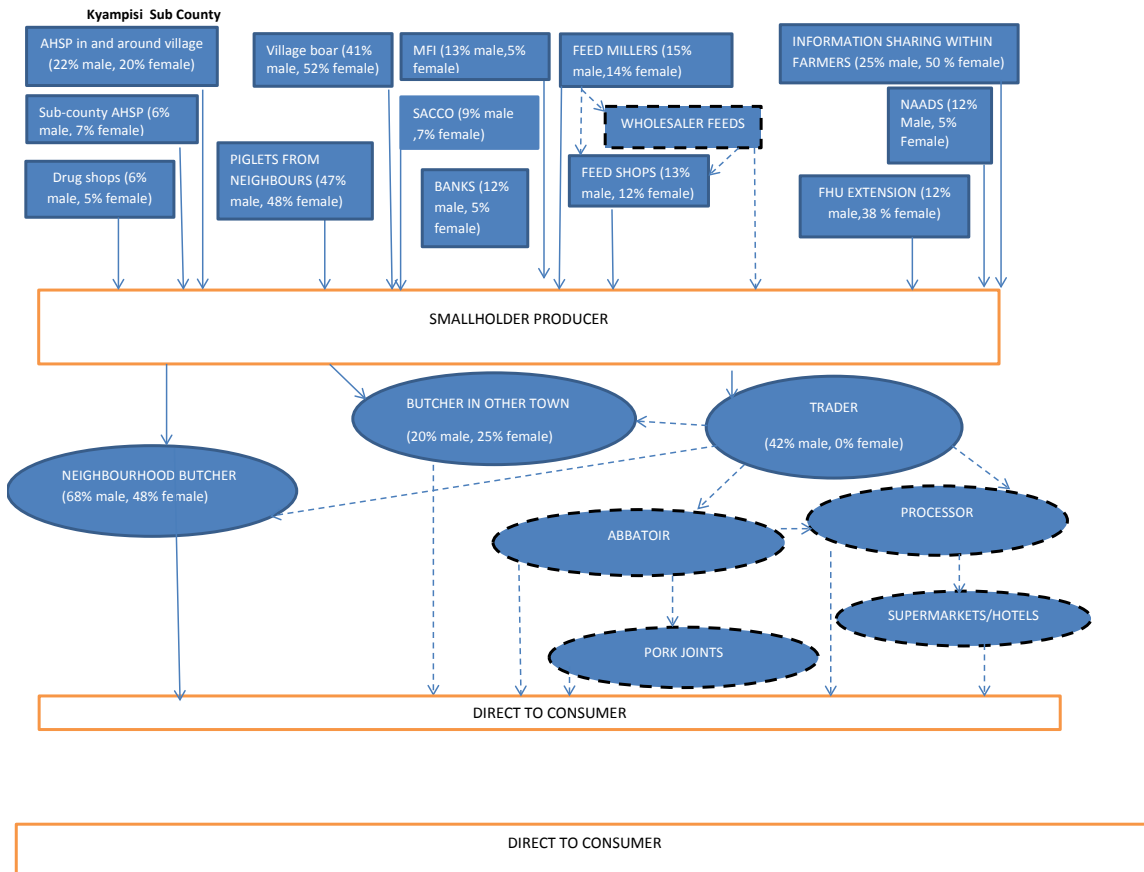
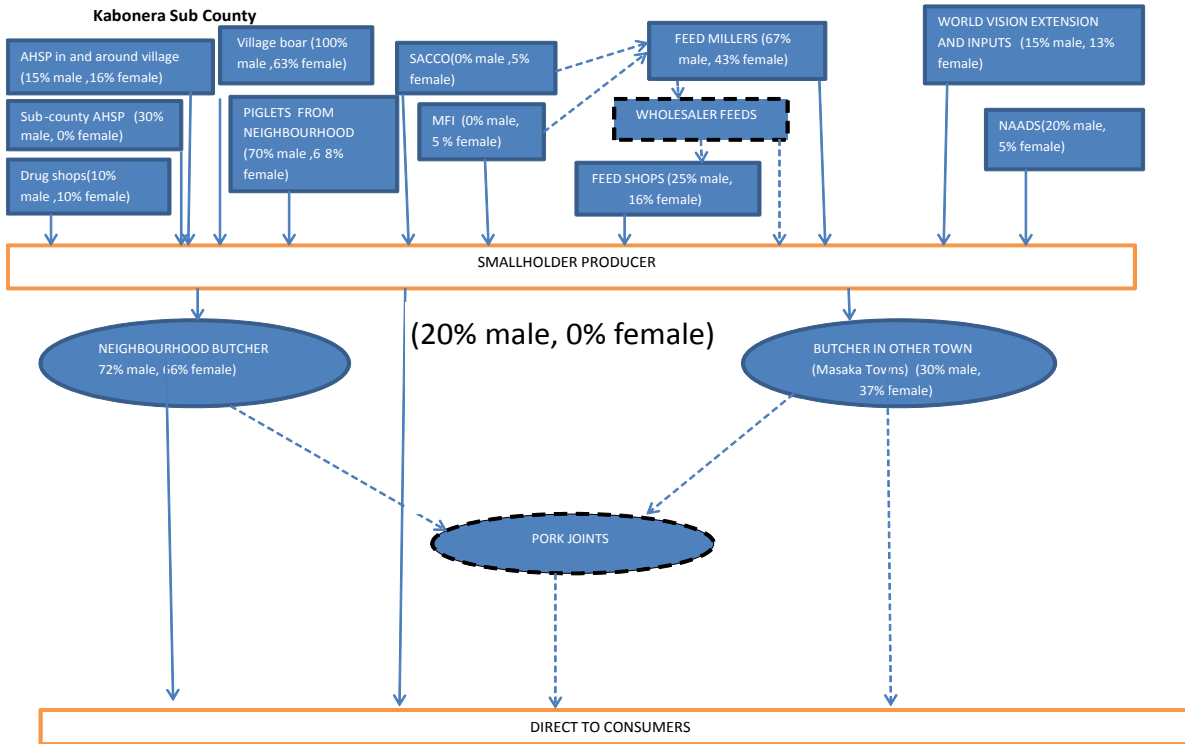
Venn diagram for institutions in Baluboinewa village, Bugulumbya sub-county, Kamuli district.

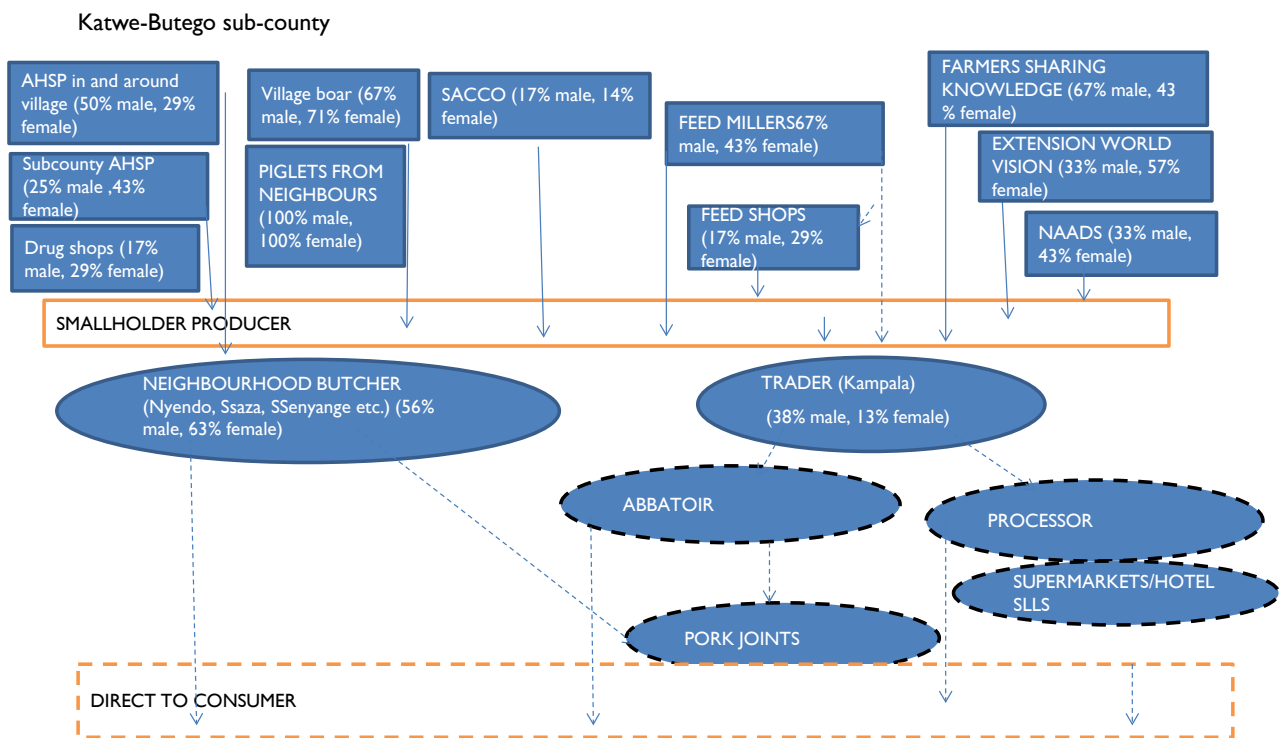
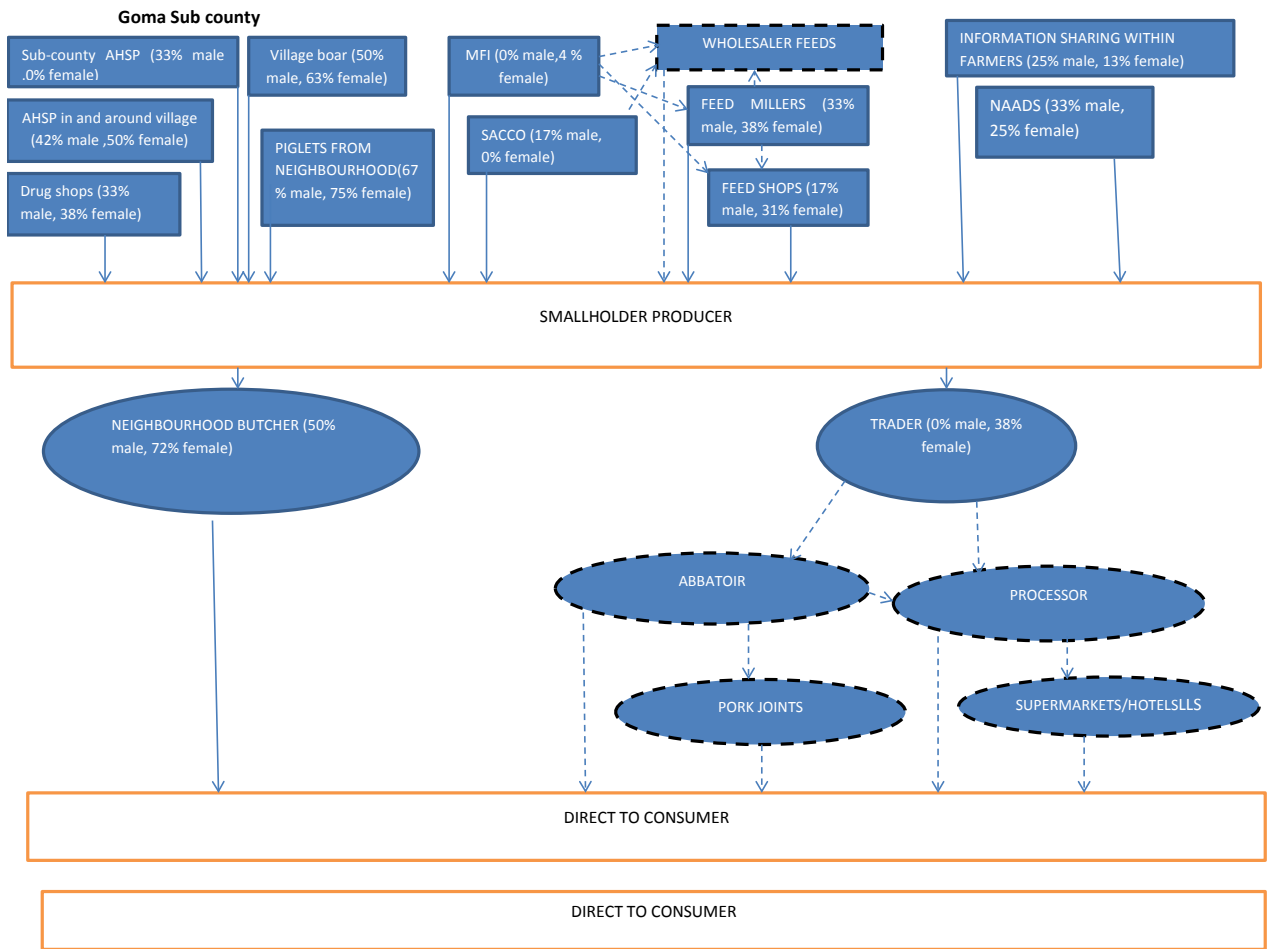


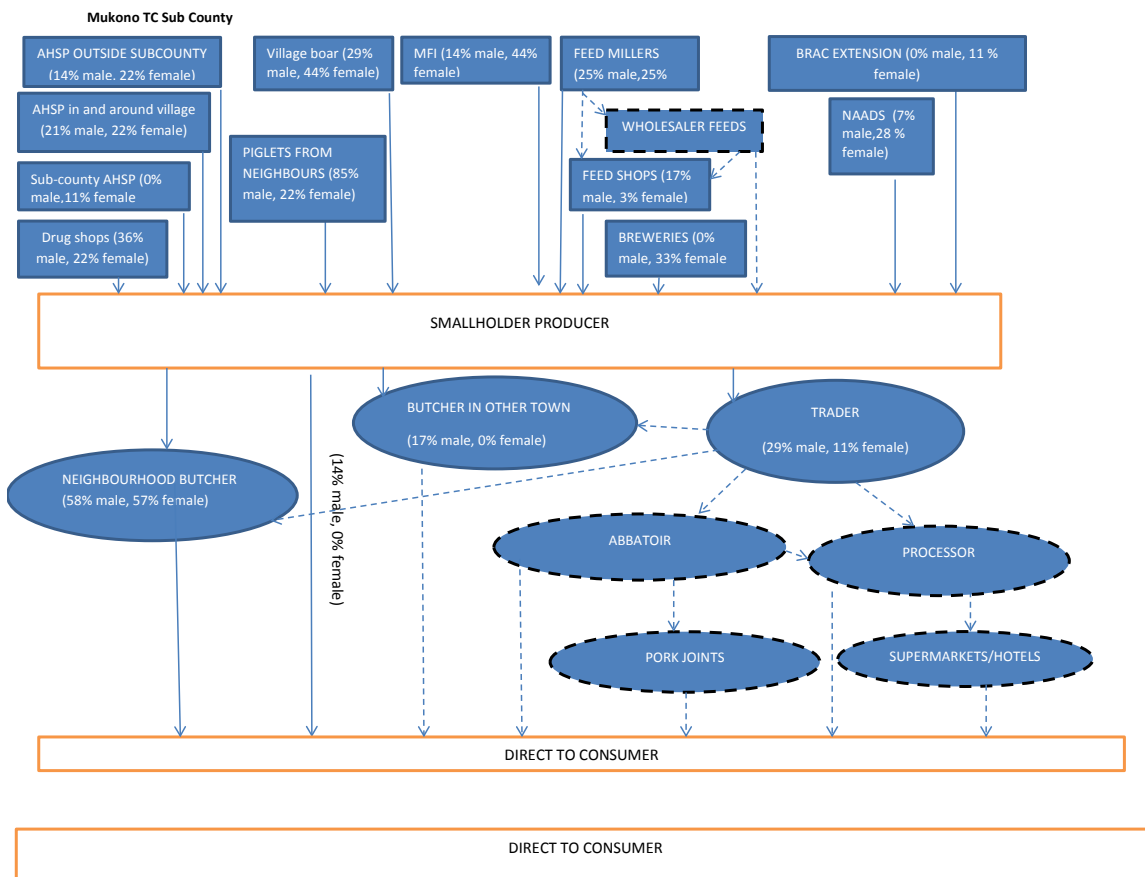
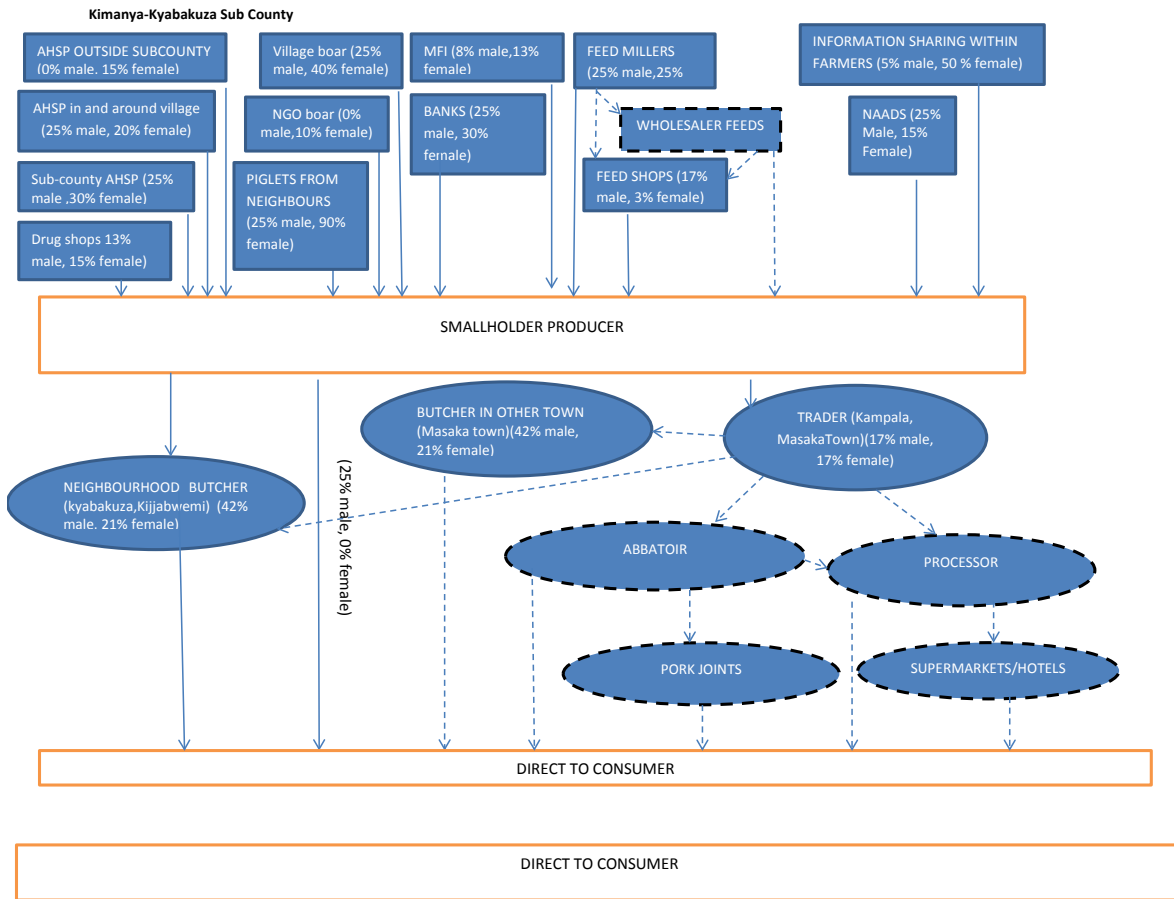
Venn diagram for institutions in Ssenya village, Kkingo sub-county, Masaka district.

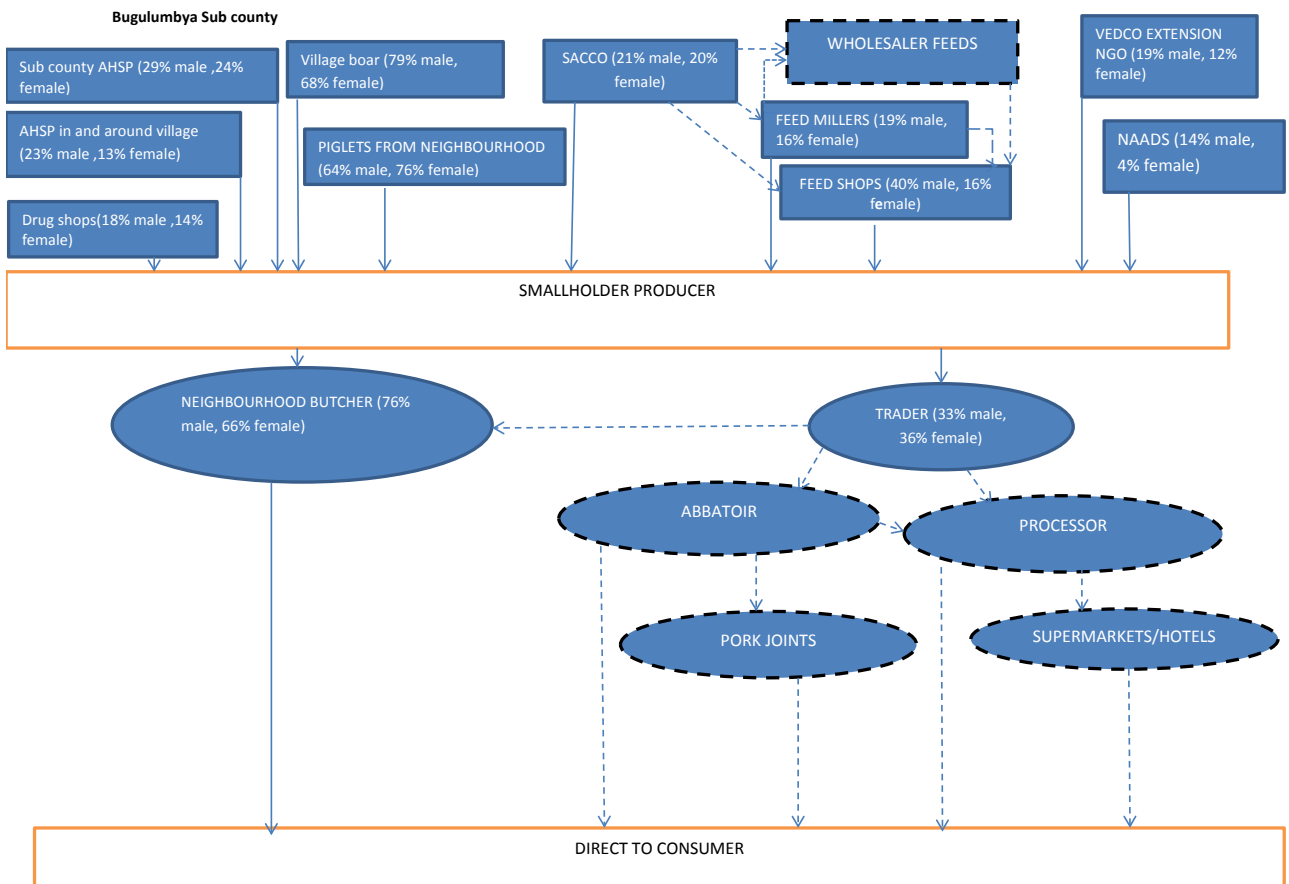
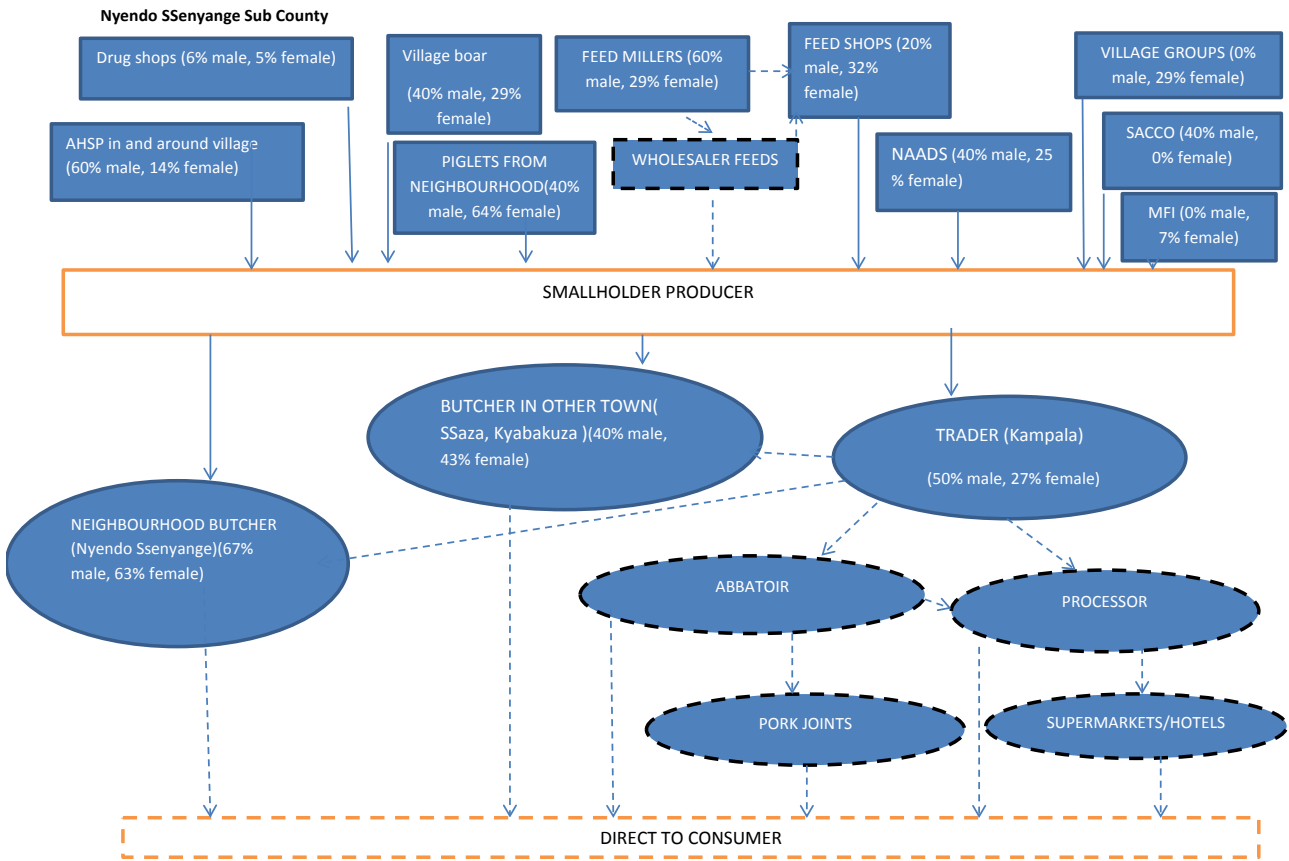


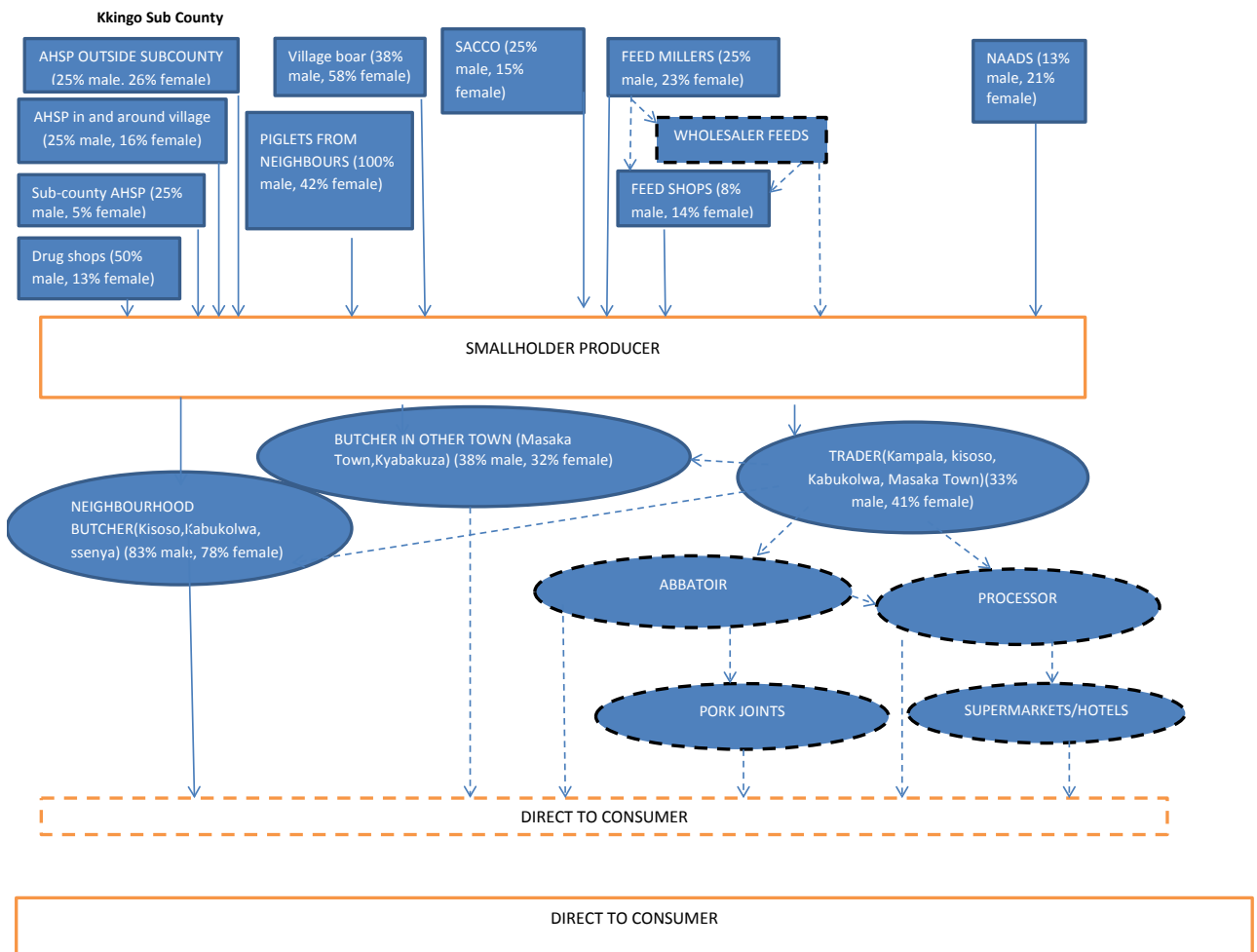
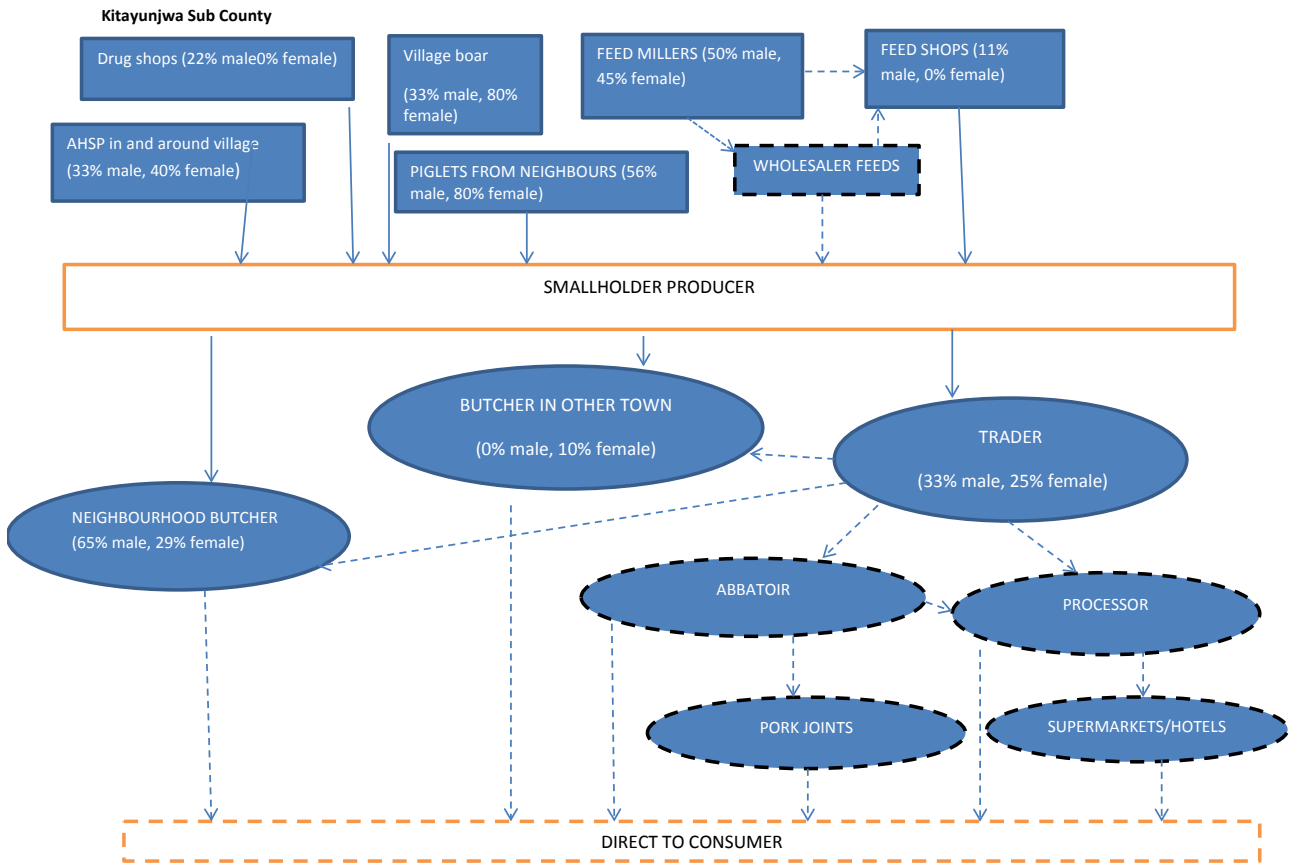
Annex 7 Value-chain maps for different sub-counties



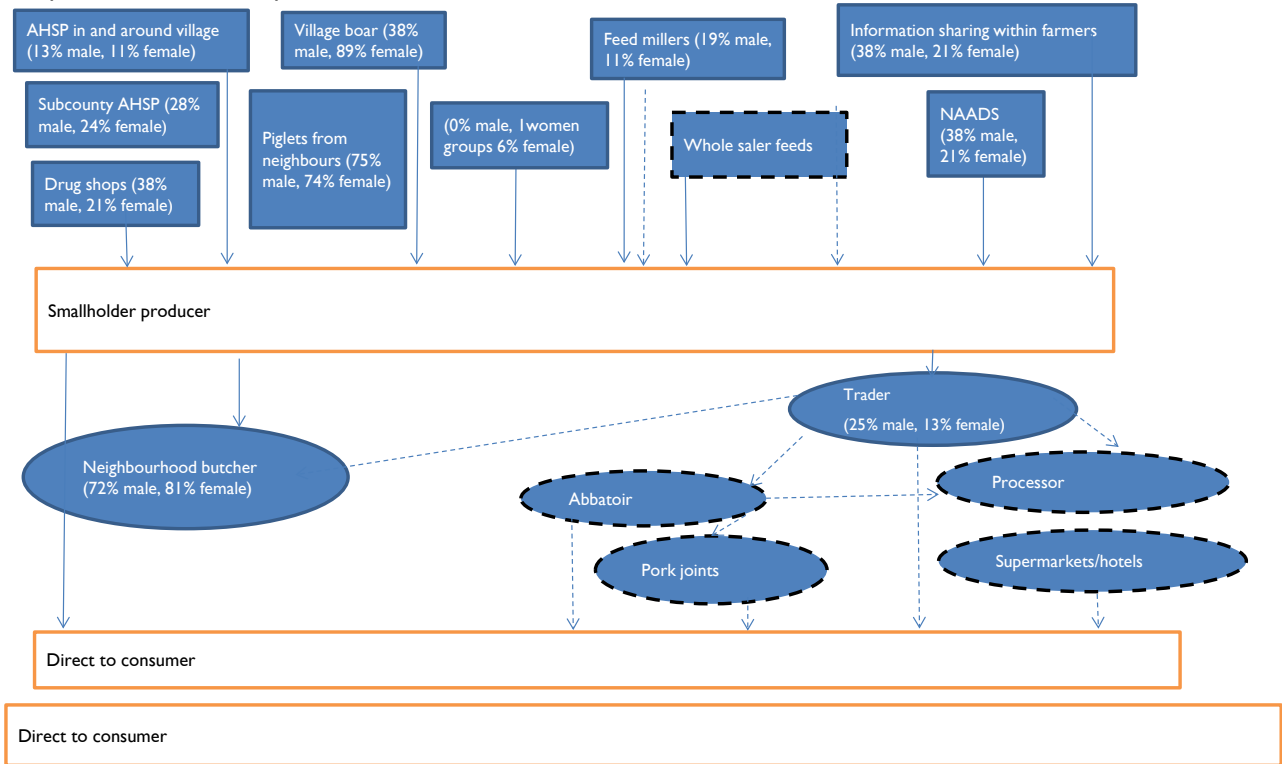




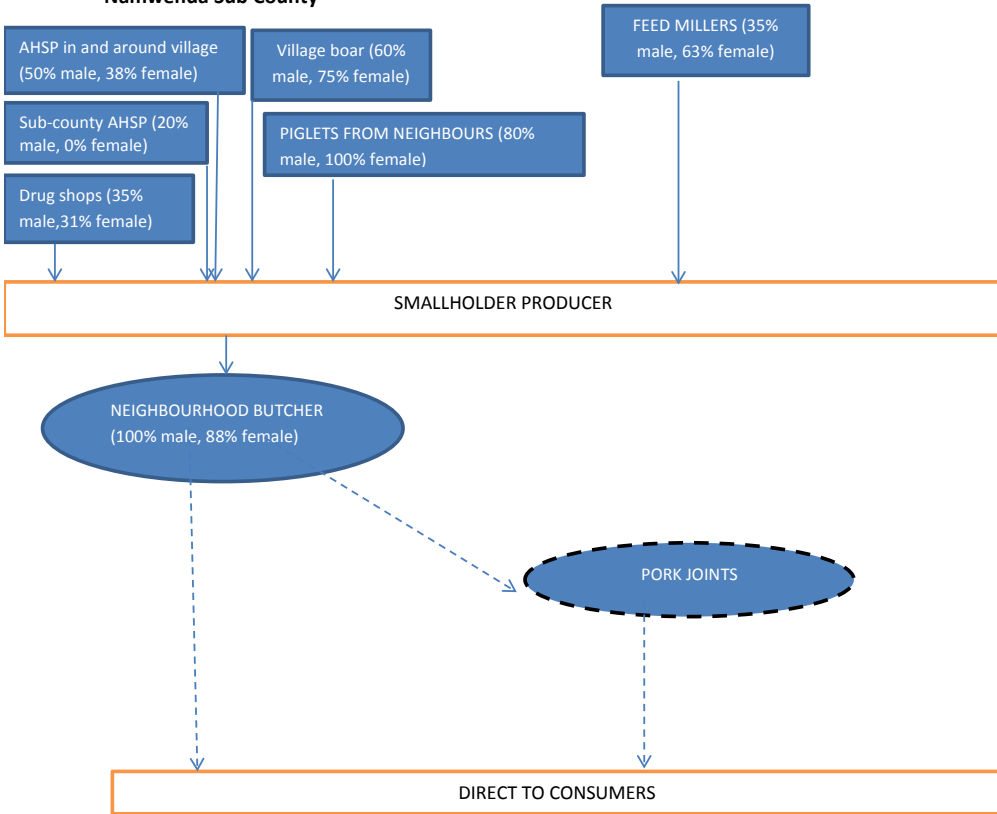


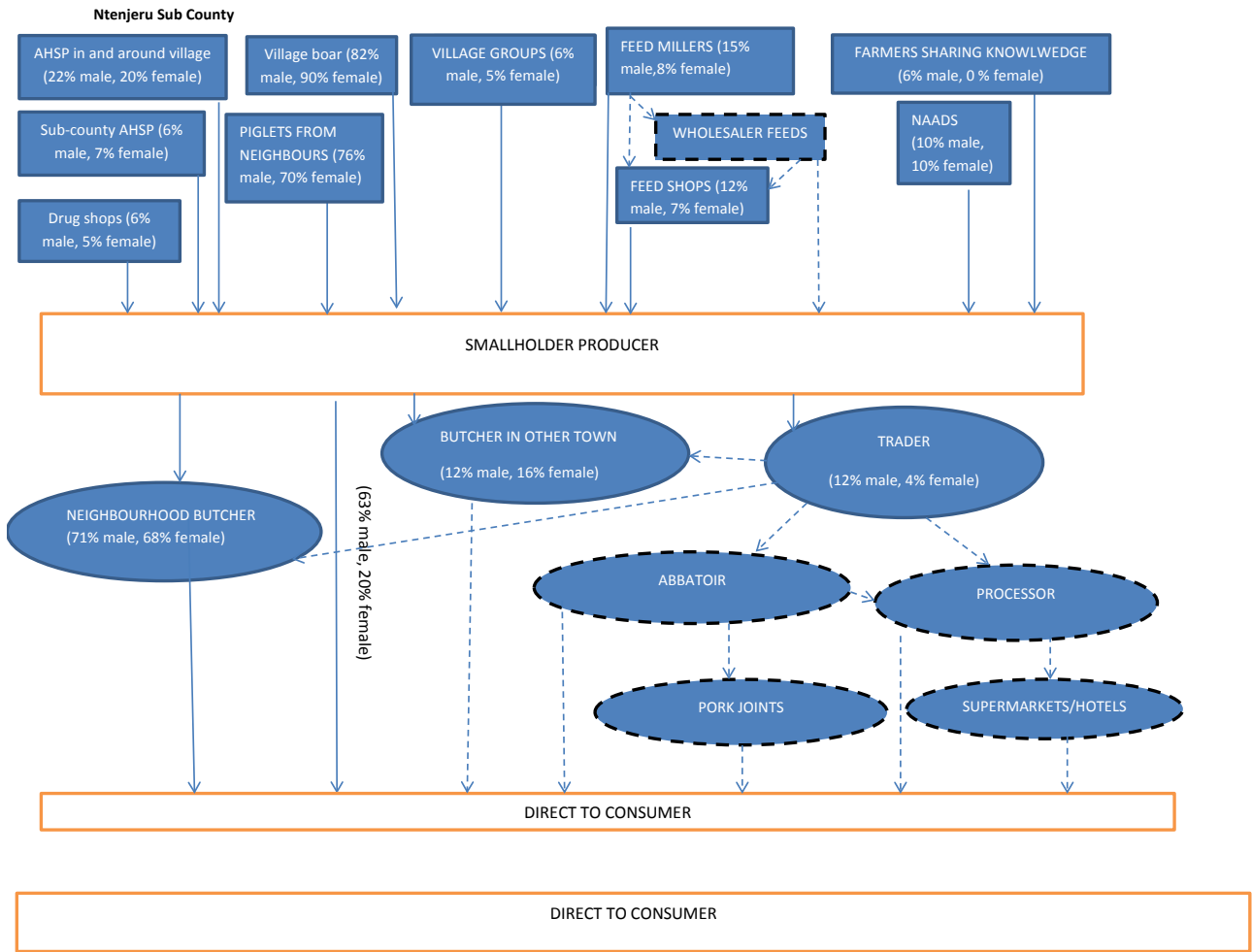


Kyanamukaka sub-county



Namwenda Sub County





Annex 8 Priority diseases affecting pigs and their clinical manifestation

Disease name	Local name	Clinical signs	Type of pig affected	Seasonality	Main effect of disease on pig
ASF	Omusujja/ Omusudha	Anorexia (35), fever (23), shivering (26), vomiting (15), unsteady gait (27), cyanosis on ears (15), Haemorrhage on skin (6), cough (3), dull eyes (1), standing hair (4), difficult breathing (3), lacrimation (2), bluish meat (1), sudden death (7), diarrhoea (10), swollen eyes (1), weakness (5), mucosal nasal discharge (2)	All types, but local breeds resist better than exotic breeds (31)	Dry season (22) Wet season (5) Unpredictable (7)	Death shortly after clinical signs (35)
Worms	Enjoka/Ebiwuka	Rough hair coat (24), swollen stomach (10), cough (38), coiled and dropping tail (7), pointed nose (1), anorexia (10), diarrhoea (17), sticky faecal material (1), worms can be seen in the faeces (8), stunted growth (8), pot belly (13), vomiting (1), restless (1), wounds on ear (1)	All breeds (32)	All year round (33)	Stunted growth and loss of weight (23), death especially piglets (1)
Lice	Ensekere/Nsekera	Appearance of lice and eggs on the skin (9), wounded (2), scratching (3) restless (1), anaemia (1),	All type (14)	all year round (14)	Stunted growth (4), loss of weight (3)
Mange	Lukuku/Olukulu	Cracking skin (5), hair loss (31), scratching (15), itchy skin, rub against wall (11), wounds on the skin (14), lack of appetite (1)	All breeds (23), improved breeds (13), white pigs (3), local breeds only (1)	All year round (26), mostly during dry season (4)	Stunted growth (26), loss of weight (6), restless, stress (2), wound on skin (16), death (11)
Flies (biting midges)	Kawawa	Wound on skin (5), irritation (3)	All but more those with open wounds (5)	during wet season (3)	Stunted growth (5), ear may be loosed (4)
Tick	Enkodho/ Enkwa	Physically seen (red, small size, spotted coat; large grey) (4)	All especially on local breeds (4)	Jiggers all season especially with no wallowing (3)	Stunted growth (3)
Jigger	Envunza	Physically seen (3)	All especially on local breeds (3)	all year (3)	Swollen feet (2), stunted (1)
Diarrhea	Ekudukana	Soiled hind quarters (6), watery faecal matters (11), dull (3), anorexia (1), coughing (3), weakness (1), pot belly (2), worms (1), pasted behind (3), straight tail (2), worms visible in faces (1)	Piglets (3–4 months old) (5) All (8)	Any time of the year but more during wet season (10)	Stunted growth (4) Death especially piglets (5)
Malnutrition	Endya embi Enjjala (hunger)	Emaciated (4), stunted, retarded grown (2), long neck, pointed mouth, hind quarters, weak, agalactia (2)	All but affect more piglets starting at three month old (10)	When bran is expensive or drought especially during dry season (8)	Don't die but reduced market value (10)

Swine erysipelas (diamond skin disease)	Ebisent	Bat like wounds/crubs (1)	All (1)	Sporadic (once to twice a year) (1)	Emaciated (1)
FMD	Kalusu	Vesicles on hooves and udder (1), mouth stunned (1)	Pregnant and farrowed sows (1)	Sporadic (once to twice a year) (1)	Don't die but reduced market value (1)
Anaemia	Anaemia	Weak piglets and sow, death of piglets at birth (1)	Piglets and sows (1)	All year (1)	Death (1)

Annex 9 Disease treatment and prevention strategies used by farmers

Disease name	Local name	Treatment and prevention	Effectiveness of treatment
ASF	Omusujja/	Antibiotic (1), human urine (5), local herbs (7), combination of aloe vera and salt (2), call veterinarian (10), no treatment (11)	Little effective (16)
	Omusudha		Very effective (4)
Worms	Enjoka/Ebiwuka	Deworming (12), tablet (14), injection (8), drenching (4), call veterinarian (4), apply hygiene (2)	No cure (9)
	Ensekere/ Nsekera		Very effective (13)
Lice			
Sarcoptic mange	Lukuku/Olukulu	Spraying with acaricide (30), ivermectin (4), apply used engine oil (13), tobacco extract (muluku) (3), scrabbling with soap (3), ambush (2), call veterinarian (4), wallowing (3)	Very effective (23)
Midge biting	Kawawa	Acaricide ('ambush poison') (13), used engine oil (20)	very effective (17)
Tick	Enkodho/	Spraying (5)	Very effective (5)
	Enkwa		
Jigger	Envunza	Wallowing (4), spraying (5)	Very effective (3)
Diarrhoea	Ekudukana	Call veterinarian (11), injection (5), dewormer (2), local herbs (1), apply good hygiene (1)	Very effective (15)
Malnutrition	Endya embi	Some farmers can stock bran (2), feed on pastures and crop residues (1)	Very effective (2), less effective (1)
	Enjjala (hunger)		
Swine erysipelas (diamond skin disease)	Ebisent	Injected on ear (2)	Very effective (2)
FMD	Kalusu	No treatment (1)	Treated by veterinarian to enable them move to slaughter (1)
Anaemia	Anaemia	No treatment (4)	N/A

*muluza, mululuza, kigagi, esikula, ekifufumu, omululuza, marijuna, nakasero.

Annex 10 Summary of key informant interviews in Mukono district

Aspect	Sub-county: Mukono town Parishes: Ntawo, Gulu, Seeta, Misindye	Sub-county: Kyampisi Parishes: Kyoga-Nakasajja, Ddundu, Kasaayi, Buntaba	Sub-county: Ntenjeru Parishes: Bunakijja-Golomolo, Kazo-Kalagala, Bugoye-Kabira, Nsanja-Gonve
Land tenure system	Private Mailo land	Private Mailo land	Private Mailo land
	Public land	Bibanja holders	Bibanja holders
	Church owned land		Public land
	Bibanja holders		Buganda Kingdom land
Crops mainly planted	Banana, coffee, cassava other crops maize, beans, vegetables	Banana, coffee, cassava other crops maize, beans, vegetables	Church owned land Banana, coffee, vanilla other crops maize, beans, yams, sweetpotatoes, groundnuts, fruit trees and vegetables
Natural resources	Several streams	Several streams and rivers	Several streams and rivers
	Protected wells	No piped water	Lake Victoria swamps
	Boreholes	Natural forest reserve present	Communal grazing areas present
	Piped water network	Several stone quarries	Lots of sand mines
Physical infrastructure	Planted forest on periphery		
	Mukono municipality has a good road network with both tarmac and murram roads. Electricity is available throughout the municipality with the exception of some parts of Misindye.	Kalagi–Gayaza, is the only tarmac road passing through Kyoga-Nakasajja and Ddundu Villages. In Kyampisi, Electricity is found in the Trading Centres and along Kalagi-Gayaza road. The other villages do not have electricity.	Ntenjeru has a well-developed network of Murram roads both trunk and feeder. Electricity is limited to along Wantoni–Katosi road, Kituuza Coffee Research Institute (NACRRRI), Kisoga Town and Ntenjeru Town.

Aspect	Sub-county: Mukono town Parishes: Ntawo, Gulu, Seeta, Misindye	Sub-county: Kyampisi Parishes: Kyoga-Nakasajja, Ddundu, Kasaayi, Buntaba	Sub-county: Ntenjeru Parishes: Bunakijja-Golomolo, Kazo-Kalagala, Bugoye-Kabira, Nsanja-Gonve
Social amenities	<p>Health centres and hospitals</p> <p>In Ntawo Ward, there is two Health Centres, a large one with Laboratory technology and smaller one.</p> <p>Gulu Ward has one large private clinic St. Peters, Seeta Ward has Kob Private Hospital, while Misindye has Goma Health Centre II.</p> <p>Hospitals services are obtained at Mukono Hospital and Kampala.</p> <p>Schools</p> <p>Several primary and secondary schools are found in the wards and additionally, there are several schools are in nearby Mukono and Kampala.</p> <p>Churches and mosques</p> <p>Several multi-denominational churches found in the wards and a few mosques.</p>	<p>Health centres and hospitals</p> <p>Buntaba Health Centre II found in Buntaba village caters for Ddundu parish. Hospital services are got from Naggalama Hospital and Kampala.</p> <p>Schools</p> <p>Kyoga has five schools, Ddundu and Buntaba have only one primary school each and no secondary school.</p> <p>Kasaayi has two primary schools and one secondary school.</p> <p>Churches and mosques</p> <p>Several churches found in the villages while mosques found in Nakasajja and Ddundu only.</p>	<p>Health centres and hospitals.</p> <p>The entire Ntenjeru depends on Ntenjeru-Kojja Health Centre IV.</p> <p>Schools</p> <p>There are several primary schools however, St. Balikuddembe Secondary School and Katosi C/U Secondary School are found in Kisoga and Katosi respectively.</p> <p>Churches and mosques.</p> <p>A number exist in the villages.</p>
Factories present	No factories but a number of animal feed mills are found here	No factories are found in these villages, however, large stone quarries are found in Buntaba village and some smaller quarries in Kyoga.	There is a vanilla processing factory in Ntenjeru Town
Markets	<p>A number of agro-produce markets, such as Seeta, Wantoni, Bonnabalye and Kinusu markets, are in Goma and Gulu wards.</p> <p>Misindye and Ntawo rely on markets in Seeta and Mukono industrial area.</p> <p>Several pork butchers are located in all wards.</p> <p>NAADS is a big buyer of piglets for distribution and breeding.</p>	<p>Agro-produce markets are located in Wakiso, Ssangalyambogo market and Kalagi market in Mukono.</p> <p>Several middle men buying pigs and pork from farmers.</p> <p>NAADS is a big buyer of piglets for distribution and breeding.</p>	<p>The main produce market is located in Katosi</p> <p>Pigs are sold locally to neighbours, butchers and middle men.</p> <p>NAADS is a big buyer of piglets for distribution and breeding.</p>

Aspect	Sub-county: Mukono town Parishes: Ntawo, Gulu, Seeta, Misindye	Sub-county: Kyampisi Parishes: Kyoga-Nakasajja, Ddundu, Kasaayi, Buntaba	Sub-county: Ntenjeru Parishes: Bunakijja-Golomolo, Kazo-Kalagala, Bugoye-Kabira, Nsanja-Gonve
Agro-input services, NGOs and government agencies	<p>The main input markets are found in Mukono industrial area.</p> <p>There are two small veterinary drug shops and one crop-input shop in Seeta.</p> <p>Government and NAADS extension services are found at Goma sub-county headquarters.</p> <p>Private extension services are offered by a few NGOs, such as BRAC, Send a Cow, EADD and individuals in Mukono.</p>	<p>Mostly rely on a small veterinary drug/crop-input shop found in Nakasajja and an animal feed Stockiest is at Kalagala.</p> <p>Most farmers get their inputs from Kalagi and Gayaza.</p> <p>Government and NAADS extension services are available at Kyampisi district headquarters, while private extension services are found in Gayaza and Kalagi.</p> <p>Food for Hunger International also offers extension services in the Kyampisi area.</p>	<p>Veterinary drug inputs and crop-input stockists are found in Kisoga, Katosi and Mukono.</p> <p>Government extension services and NAADS are at Ntenjeru sub-county and Mukono district headquarters.</p> <p>NGOs such as Sasakawa Global 2000, EADD, VEDCO, ASARECA, Agro-Technologies Ltd provide private extension services.</p>
Abattoirs	<p>There are no abattoirs for pigs in Mukono.</p> <p>Pigs are slaughtered at the local butchers or in farm yards.</p>	<p>Slaughters are done locally at the source, while pork or live pigs are sold to middle men.</p>	<p>Slaughter of pigs is done locally at the point of origin or at the local butcher.</p> <p>Large-scale farmers in Mukono have slaughter slabs and sell their pork to outlets, such as Fresh Cuts.</p>
Financial services	<p>Several banks namely Finance Trust Bank, Barclays, Stanbic, Centenary Bank, Global Trust, Crane, Baroda, Bank of Africa.</p> <p>Sonde microfinance institution in Misindye.</p> <p>Two SACCOs.</p> <p>NGOs offer microcredit to farmers, such as Caritas, Heifer International, BRAC.</p>	<p>One bank (Opportunity Bank).</p> <p>Two SACCOs.</p>	<p>One trust fund</p> <p>One SACCO.</p>

Major challenges (shocks)	Villages	Impact	Coping strategies	Consequences
Drought	Periodic Ntawo Gulu Seeta Misindye Kyoga Ddundu Bunakijja Bugoye Nsanja Buntaba Kazo-Kalagala	Food shortage Expensive feeds Poor quality feeds Stunted pigs	Reduce portion and meals per day Buy food Sell pigs Let pigs roam Feed poor quality bran Change work e.g. fishing or work for another Temporary relief	Change of diet Low weight of pigs Low prices Poor most affected
Hailstorms	Ntawo Gulu Seeta Misindye Kyoga Ddundu Bunakijja Bugoye Nsanja Buntaba Kazo-Kalagala	Destroy banana High food prices Destroy houses	Replant Plant new crops Ask for assistance Loss of harvest Do not work	All affected
Human diseases Measles Cough Malaria HIV/AIDS	Kyoga, Seeta Ntawo Kazo-Kalagala Seeta, Gulu Bunakijja- Golomolo	Death Reduced labour productivity High treatment costs	Sensitization Treatment Vaccination Use insecticide treated nets ABC strategy (abstinence, be faithful, condoms) adopted	Death Poor/ low production High medical bills Women, children, poor, most affected
Animal diseases ASF Foot rot Newcastle disease Lumpy skin Infertility in cattle	Ntawo Gulu Seeta Misindye Kyoga Ddundu Bunakijja, Kazo, Bugoye Nsanja	Death Poor market for pigs Sell off pigs Reduced pig numbers Increase veterinary costs	None Sell off pigs Local remedies Treatment of affected Delay restocking Limited success	Death Failed piggery All affected
Crop diseases Cassava Mosaic Cassava Brown Streak Banana Bacterial Wilt Tomato Bright Army Worm	Ntawo Gulu Seeta Misindye Kyoga Ddundu Bunakijja Bugoye Nsanja Buntaba Kazo-Kalagala	Loss of yields Food shortage	Training and sensitization Change of crop planted Uproot and burn Plant resistant varieties Get new varieties from research Spraying with insecticide and herbicide Limited success	Change of crop pattern All affected
Market best shocks	Following droughts Seasonal	Expensive feeds Feed poor quality alternatives Reduce of numbers Change enterprise	Sell of pigs Stop rearing pigs and poultry Buy food Reduce animal rations Feed grasses, potato vine, etc.	All affected
Theft of livestock	Seasonal Kyoga and Misindye	Loss of animal Loss of income	Hiring of village guards Formation of committees Deterrent/limited success	All affected Loss of income Threaten food security
Land issues	Buntaba	Affects production on contested land Discourage investment	Form land committees at S/ County Legislation Arbitration	Production affected All affected

Annex II Summary of key informant interviews in Kamuli district

Aspect	Sub-county: Kitayunjwa				Sub-county: Bugulumbya				Sub-county: Namwendwa			
	Site 1 Parish: Busota village: Kawukye	Site 2 Parish: Busota village: Butabala	Site 1 Parish: Nawanende village: Busubi	Site 2 Parish: Nawanende village: Busubo	Site 3 Parish: Kasambira village: Bukyonzza B	Site 4 Parish: Kasambira village: Balubweinewa	Site 1 Parish: Isingo village: Isingo B	Site 2 Parish: Isingo village: Isingo A				
Natural resources	Relatively high population density and land fragmentation	Relatively high population density and land fragmentation	Village is partially surrounded by a swamp.	Village is partially surrounded by a swamp	Small swamp within the village	Small swamp within the village	Small swamp within the village	Small swamp within the village				
Land ownership and land use	Mainly 0.1–10 acres Land is under customary tenure mostly owned by men Mainly grow banana, coffee, then roots and tubers	Mainly 0.5–4 acres Land is under customary Mostly owned by men Mostly used for Crops (banana, coffee, then roots and tubers) Livestock kept include (cattle, goat, pigs, chicken)	Mainly 1–10 acres Land is under customary land mostly used for crops growing of rice has caused water contamination and drying up Livestock mainly kept include goat, pig, chicken, sheep.	Mostly < 2 acres Land is under customary Majority of land is owned by men. Women usually own land after the death Mostly used for crops Livestock kept include (cattle, goat, pigs, chicken)	Mainly 0.5–9 acres Land is under customary Majority of land is owned by men. Women usually own land after the death Sugarcane growing is becoming more dominant due to newly set up sugar factory	Mainly 0.5–8 acres Both genders have access to land use. Usually they both agree on land use allocations Sugarcane growing is becoming more dominant due to newly set up sugar factory	Mainly 0.1–1 acres Both genders have access to land use. Usually they both agree on land use allocations	Mainly 0.1–0.9 acres Usually they both agree on land use allocations				

Aspect	Sub-county: Kirayunjwa				Sub-county: Bugulumbya				Sub-county: Namwendwa	
	Site 1 Parish: Busota Village: Kawukye	Site 2 Parish: Busota Village: Butabala	Site 1 Parish: Nawanende Village: Busiwa	Site 2 Parish: Nawanende Village: Busubo	Site 3 Parish: Kasambira Village: Bukyonza B	Site 4 Parish: Kasambira Village: Balubweinewa	Site 1 Parish: Isingo Village: Isingo B	Site 2 Parish: Isingo Village: Isingo A		
Social infrastructure	Two NGOs, (Plan and Brac). VSLAs are main sources of credit. Three mosques signifying presence of muslims.	One mosque VSLA is main source of credit. NAADS, Plan and Africa2000Network are the active agencies.	One mosque. Five VSLAs. Plan, VEDCO, NAADS, Heifer International, Red Cross, hospice.	No mosque but there are two churches and two primary schools. VEDCO, Plan and NAADS are active.	Three VSLAs. Plan Uganda only NGO operating here.	No mosque. Nearest hospital is 20km away. Two VSLAs Plan, VEDCO, NAADS are active agencies	Two VSLAs supported by Plan Uganda and Brac. NAADS providing piglets and some extension services.	Two VSLAs supported by Plan Uganda and Brac NAADS providing piglets and some extension services		
History (Peculiar occurrences in past 10 years)	Floods in Nov2006 and May 2007. Droughts. occurred during March to Sept. 2010 and Sept 2012-Jan 2013.	Drought/Famine in 2010 and 2011.	Drought in 2008 and 2010.	Drought occurrences from 2008-2012.	New Sugar Factory has been set up. Droughts	Droughts in 2005, 2007 and 2012 Drought in 2010, 2011, 2012. Striga weed incidence.	Drought in 2010, 2011, 2012 Striga weed incidence			
Status of livestock enterprises	no veterinary and livestock extension services.	Two para-veterinarians who offer veterinarian services and extension.	Livestock enterprises on the rise as annual crops suffered floods.	Increased pressure on land has eliminated communal grazing pastures leading to more semi-intensive and intensive livestock farming.						

Aspect	Sub-county: Kirayunjwa				Sub-county: Bugulumbya				Sub-county: Namwendwa			
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 1	Site 2
Shocks affecting agro-enterprises	Parish: Busota Village: Kawukye	Parish: Busota Village: Butabala	Parish: Nawanende Village: Busiwa	Parish: Nawanende Village: Busubo	Parish: Kasambira Village: Bukyonza B	Parish: Kasambira Village: Balubweinewa	Parish: Kasambira Village: Isingo B	Parish: Isingo Village: Isingo A	Parish: Kasambira Village: Isingo B	Parish: Isingo Village: Isingo B	Parish: Isingo Village: Isingo B	Parish: Isingo Village: Isingo A
Coping mechanisms in place	African swine fever, mange, worms, coccidiosis, external parasites, and trypanosomiasis. Prolonged droughts. Farmers seek treatment for their stock while others. Rush to sale off their stock. Quarantine is also normally imposed	Trypanosomiasis, Newcastle, ASF and FMD.	Prolonged drought. Unpredictable rainfall.	Prolonged drought Diseases mostly ASF	Droughts Floods (July to Dec 2012) ASF is most notorious	Drought Drought	Drought Drought	Drought Drought	Drought Drought	Drought Drought	Drought Drought	Drought Drought
Effects of shocks on men/women	Livestock were fed on failed crops, dry pastures, shrubs and pseudo banana stems with minimal provision of water.. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.	Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. Livestock were raised by feeding them on the failed crops, dry pastures and shrubs, and minimal provision of water. A number of pig deaths hence reduced incomes for farmers.
No. of respondents Male: Female	7 males 2 females	3 males 2 females	5 males 1 females	3 males 4 females	4 males 4 females	4 males 0 females	6 males 3 males	3 males 3 females	3 males 3 females	5 males 2 females	5 males 2 females	5 males 2 females

Annex 12 Summary of key informant interviews in Masaka district

	Sub-county: Kimanya-Kyabakuza		Sub-county: Katwe Butego		Sub-county: Nyendo-Ssenyange		Sub-county: Kyanamukaka	
Aspect	Parish: Kimanya-Kyabakuza, Village: Kyabakuza, Kijjabwemi,	Parish: Kimanya-Kyabakuza, Village: Kijjabwemi,	Parish: Katwe, Village: Kirumba B	Parish: Butego, Village: Butego	Parish: Nyendo, Village: Kitovu-Nnume	Parish: Kamuzinda, Village: Bukunda + Kanoni	Parish: Zzimwe, Village: Lukindu B	Parish: Buyaga, Village: Nkoma
Natural resources	Stony red loams Swamp exists No forest No communal grazing lands	River crosses through Two spring wells	River crosses through plus a swamp Planted forest Loam soils in Central village, Clay soils near swamp and stony soils North One spring well One protected well	River crosses through plus a swamp on the border Five spring wells—two protected wells Fertile loam soils	No river, pond or stream	One protected spring Three spring wells Two rivers	Three spring wells One borehole Communal range lands available along rivers and streams Forest reserve in Lukindu (A), - Private eucalyptus forests Lukindu (B)	Two rivers Four wells Two private pine forests
Land ownership and land use	Mostly leaseholds on public land and some Bibanja Land is known to be owned only by men Increased land fragmentation	Mostly leaseholds on public land and on public land	Mostly leaseholds on public land	Mostly leaseholds on public land	Mailo, leasehold and Bibanja Increased land fragmentation (Av is 0.125 acres from 0.5 acres 10 years ago)	Bibanja holders on land owned by two individuals Banana coffee plantations and roots/tubers Eight privately owned forests	Public land near streams and rivers mostly used for grazing The rest is Mailo land	Public land used for communal grazing Buganda Kingdom land Private Mailo land

Aspect	Sub-county: Kitayunjwa				Sub-county: Bugulumbya				Sub-county: Namwendwa				
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	
	Parish: Busota village: Kawukye	Parish: Busota village: Butabala	Parish: Nawanende village: Busiwa	Parish: Nawanende village: Busubo	Parish: Nawanende village: Busiwa	Parish: Nawanende village: Busubo	Parish: Kasambira village: Bukyonza B	Parish: Kasambira village: Balubweinewa	Parish: Isingo village: Isingo B	Parish: Isingo village: Isingo A	Parish: Isingo village: Isingo B	Parish: Isingo village: Isingo A	
Physical infrastructure	Piped water from national grid No livestock market No cattle dip No slaughter house Veterinarian clinic and drug shops exist	Piped water Two banana stalls No livestock market Four pork and four beef stalls	Piped water Four road side stalls Two pork stalls No dip, no feed stockists, no veterinarian clinic	Piped water Farm produce mainly sold at farmgate and at trading centre No market, no abattoir, no veterinarian clinic of veterinarian shop	Piped water Four road side stalls Two pork stalls No dip, no feed stockists, no veterinarian clinic	Piped water Farm produce mainly sold at farmgate and at trading centre No market, no abattoir, no veterinarian clinic of veterinarian shop	Piped water with good network coverage No market Four pork stalls - one beef stall One fish stall Some maize mills present (sources of maize bran)	Two beef butchers Two pork butchers Three fish stalls Two veterinarian drug shops/clinics Two livestock feed stockists	Good murrum road network No electricity No piped water	Good murrum road network No electricity No piped water	Piped water with good network coverage No market Four pork stalls - one beef stall One fish stall Some maize mills present (sources of maize bran)	Two beef butchers Two pork butchers Three fish stalls Two veterinarian drug shops/clinics Two livestock feed stockists	Good murrum road network No electricity No piped water
Social infrastructure	No banks One SACCO No health centre	Two churches One mosque Three primary, one secondary school	One church One primary school, one secondary school, two nursery school,	One secondary school, One nursery school	One church One primary school, one secondary school, two nursery school, One university	One secondary school, One nursery school	Six primary schools Two churches	Two primary schools Three churches	Health centre 3km away One secondary school	Health centre 3km away One secondary school	Six primary schools Two churches	Two primary schools Three churches	Health centre 3km away One secondary school

Aspect	Sub-county: Kitayunjwa				Sub-county: Bugulumbya				Sub-county: Namwendwa			
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 1	Site 2
NGOs and Agencies operating in the area	Parish: Busota village: Kawukye	Parish: Busota village: Butabala	Parish: Nawanende village: Busiwa	Parish: Nawanende village: Busubo	Parish: Kasambira village: Bukyonza B	Parish: Kasambira village: Balubweinwa	Parish: Kasambira village: Bukyonza B	Parish: Kasambira village: Balubweinwa	Parish: Isingo village: Isingo B	Parish: Isingo village: Isingo A	Parish: Isingo village: Isingo B	Parish: Isingo village: Isingo A
	World Vision, Child Care International, MADDO, Rotary Club, BUSODA	Compassion International, Aid Child, Vi Agroforestry, NAADS (provides advisory services + technologies), Sub-county community development project	Medical Research Council, ANAWEZA, NAADS (provides advisory services + technologies), Sub-county community development project	NAADS (provides advisory services + technologies), Sub-county community development project	BRAC, Caritas-MADDO (supporting cattle zero grazing), NAADS (Provides advisory services + technologies), Sub-county community development project	NAADS (Provides advisory services + technologies), Sub-county community development project	NAADS (Provides advisory services + technologies), Sub-county community development project	NAADS (Provides advisory services + technologies), Sub-county community development project	Kitovu Mobile, MADDO, ANNPCAN, NAADS (Provides advisory services + technologies), Sub-county Community Development Project	Kitovu Mobile, NAADS (Provides advisory services + technologies), Community Development Project (CDD), GOAL project	Kitovu Mobile, NAADS (Provides advisory services + technologies), Community Development Project (CDD), GOAL project	Kitovu Mobile, NAADS (Provides advisory services + technologies), Community Development Project (CDD), GOAL project
	Wealth distribution											
Sources of credit		Local VSLAs		None								
History (Peculiar occurrences in past 10 years)		Droughts and ASF outbreaks	Droughts and ASF outbreaks	Droughts and ASF outbreaks	African Swine Fever outbreak	African Swine Fever outbreak	African Swine Fever outbreak	African Swine Fever outbreak	2011 and 2012 African Swine Fever outbreak	2011 and 2012 African Swine Fever outbreak	2011 and 2012 African Swine Fever outbreak	2012 Newcastle disease

Aspect	Sub-county: Kitayunjwa		Sub-county: Bugulumbya			Sub-county: Namwendwa		
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2
	Parish: Busota village: Kawukye	Parish: Busota village: Butabala	Parish: Nawanende village: Busiwa	Parish: Nawanende village: Busubo	Parish: Kasambira village: Bukyonza B	Parish: Kasambira village: Balubweinewa	Parish: Isingo village: Isingo B	Parish: Isingo village: Isingo A
Status of livestock enterprises	ASF and lumpy skin disease most severe	ASF severe	ASF severe	ASF severe	These are high	These are high	ASF reduced pig population by half	ASF, mumps and lice ranked high
Gender in livestock management	Pig population is three times higher than 10 years ago	Lumpy skin disease severe	Mange (High)	Mange (High)	Mange	Mange	These too are high	
Shocks affecting agro-enterprises	Water mainly for animals collected by women and children	Newcastle disease (High)	Newcastle disease (High)	Newcastle disease (High)	Worms	Worms	Worms	
Coping mechanisms in place	Drought of 2010 and 2011	Biting flies	Pig population is three times higher than 10 years ago	Lumpy skin disease	Newcastle disease	Lumpy skin disease	Erysipelas	
No. of respondents	Drought of 2010 and 2011	African Swine Fever Outbreak of 2010–2011	Drought of 2010 and 2011	Drought of 2010 and 2011	2011 and 2012 ASF outbreak	2011 and 2012 ASF outbreak	In 2011 and 2012 ASF outbreak	
Male:female	African Swine Fever Outbreak of 2010–2011	Severe feed shortage which led to destocking	Severe feed shortage which led to destocking	Diversification to other income sources			Depend on educated children to provide for their needs	
	4 males	3 males	4 males	4 males	4 males	4 males	4 males	3 males
	3 females	2 females	2 females	3 females	2 females	3 females	3 females	10 females

Aspect	Sub-county: Kabonera		
	Parish: Buyaga village: Kyamuyimbwa-Kikalala	Parish: Kiziba village: Kabonera A	Parish: Kiziba village: Busagala, Kiziba
Natural resources	Three wells One borehole	None Use what is in neighbouring village Planted Eucalyptus forest	One borehole Two spring wells
Land ownership and land use	Mostly Private Mailo land with Bibanja holders	Mostly Private Mailo land with Bibanja holders	Mostly Private Mailo land with Bibanja holders
Physical infrastructure	Two banana stalls Three pork butchers One feed stockist	70% of all households are connected to the national grid for electricity Weekly produce market with temporary structures Two pork stalls Eight beef stalls Ten fish stalls Two feed stockists One maize mill present Weekly produce market	Good murram road network One pork butchery One beef butchery Market is in neighbouring village –Kabonera A
Social infrastructure	Three primary schools One secondary school Two churches One mosque	One primary school One nursery school Two private clinics	One primary school One nursery school One church One mosque
NGOs and Agencies operating in the area	One health centre II World Vision (support orphans)	Health centre II in next village NAADS Community Devt Project World Vision, TASO, Kitovu Mobile, Uganda Cares Medical Research Council	World Vision (supports orphans) Kitovu mobile (on HIV) NAADS, CDD program,

Sub-county: Kabonera			
Aspect	Parish: Buyaga Village: Kyamuyimbwa-Kikalala	Parish: Kiziba Village: Kabonera A	Parish: Kiziba Village: Busagala, Kiziba
Wealth distribution	3% high, 12% middle 85% low MFI is 3 KM away	22% high, 33% middle 45% low No bank but 2km away in neighbouring village	0% high, 75% middle 25% low MFI is 5KM away
Sources of credit			
History	Sever Hail storms in 2010 and 2011		Hailstorm in 2010
(Peculiar occurrences in past 10 years)			
Status of livestock enterprises	Pig population has risen x fivefold over the past 10 years	Pig production has grown over the past 10 years by x 3.5 fold	Pig production has grown over the past 10 years by x threefold
Gender in livestock management	Livestock mostly owned by women Women and children cater for feeding and water provision for the animals	Both men and women are involved in pig rearing responsibilities	ASF (high) Mange (high) Lice (High) Worms (high) -Both men and women are involved in pig rearing responsibilities
Shocks affecting agro-enterprises	African Swine Fever in 2010 and 2011		
Coping mechanisms in place	Damaged crops given to animals		Graduated and employed children support their parents in pig production activities
No. of respondents Male: Female	Males 6 Females 3	Males 4 Females 2	Males 2 Females 7
			Money accruing from coffee sells is used to buy animal feeds and expansion of pig units

Annex 13 Problem-opportunity matrix for pig health and management

Constraints	What is it related to?	What is already being done?	What more can be done?	Who has to do it?	How it can be done?
Poor veterinary services	Lack of qualified vets	Farmers treat their own animals or resort to private vets	Get more and qualified vet	Government authorities	Set an information system using the veterinarian scouts to refer cases to qualified veterinary officers
	Faked drugs	Borrow money to purchase drugs Inform the authorities about the quality of the drugs Use of traditional medicine	Proper identification of the right vet Increased accessibility to veterinarians and train farmers in pig health management Hire more vets Have government veterinarians at parish	NGOs Farmer Research institutes	Have direct contact with the DVO Get the DVO monitor the quality of the veterinarian services Bring veterinarian services nearer to farmers
Expensive drugs and veterinarian services	Lack of funds to buy drugs	Farmers buy own drugs and they administer themselves	Get more resistant pig breeds to diseases	Government authorities	Get support from NGOs through local government
	Expensive veterinarian services	Sell chicken, farm products or crops to raise money to hire veterinarians or buy drugs	Acquire knowledge on treatment	Farmers NGOs	Training of farmers or farmer leader on drug administration
	Limited access to drugs	Use available veterinarians and buy drugs	Access to good quality veterinarian services Minimized cost of treatment and access to cheap drugs Get loan to buy for treatment	Research organizations	Bring veterinarian services closer Establishing a veterinarian drug shop within area and drugs sold at low cost

Constraints	What is it related to?	What is already being done?	What more can be done?	Who has to do it?	How it can be done?
Lack of routine prophylaxis	No vaccination or proper deworming program	Seek advice from veterinarian staff Try to treat after seeing the problem	More awareness on the importance of record keeping Trainings on pig husbandry and record keeping More sensitization on importance of vaccination	Sub-county authorities District veterinary department Farmers attending trainings Local government staffs from farmer groups	Bring drugs closer Mobilize farmers and farmer group at village level to attend trainings
Lack of feeds	Unavailable feeds	Use forages and peelings Stock maize bran, use peelings and potato vines for use in times of scarcity Planting more potatoes, vines, yams and vegetables and use of pastures	Obtain good quality feeds Increase feed production and availability Training on feed mixing using locally available ingredients Timely planning to avoid feed scarcity, trainings in feed mixing Increased access to knowledge on feed strategies	Farmers Research organizations	Obtain loan to buy feed Grow more food to supplement the pigs Plant more food, proper storage of feeds for the dry season, getting knowledge on feed mixing Bring feed factories and shops near Training of farmers on feeding strategies
Expensive feeds	Commercial feeds expensive	Sell pigs and restock feeds Use of peelings or allow them to scavenge	Acquire funds for inputs and training in the use of local ingredients Identify alternative sources of feed	Farmers NGOs Research organizations	Grow crops like cassava, yams, or stock maize when Lower the prices of feeds Training of farmers of feeding strategies

Constraints	What is it related to?	What is already being done?	What more can be done?	Who has to do it?	How it can be done?
Poor feeds quality	No access to good feeds quality Lack of knowledge on feeding strategies	Tried to get different types of feed especially grasses and forage because it is more accessible. Use of peelings, vines and poor quality tubers Growing maize sweetpotato and cassava Stock maize bran Collect left over from restaurants (in urban areas) Feed any kind of food they have access (no choice) Attended some training on pig feeding Find genuine suppliers, inform suppliers of their poor quality feeds	Trainings on feed formulation and promote the use of local feeds Trainings farmers on pig feeding and promote own feed production Exchange visits to progressing farmers Access to good quality feeds and farmers to invest more of feeding Grow more crops for vines and supplement with maize bran	District veterinary department authorities Farmers and development partners (NGOs) Government authorities	Mobilize farmers for trainings and room for exchange visits and spine reading materials through farmer group Have farmer organizations on pig farming Access to cash to buy good quality feed stuffs like maize bran Form farmer groups, buy ingredients together, share information Training on proper use of available feed stuffs, increase effective use and processing of locally available feeds
Poor housing	Lack of space Lack of fund to construct house Poor hygiene Harsh weather	Tethering and moving pigs from one place to another or open closure Local materials like grass, off-cuts and polls are used Stock a few pigs utilize the available space Sell some animals to meet the construction costs Get loans from other sources to build houses Adapt sense of responsibility as regard to biosecurity	Trainings on proper housing and carrying capacity Developing organizations support with iron sheets and the farmers provide local materials Be more responsible as regard hygiene Utilize the available efficiently by maximizing use of small space	Farmers and farmer groups Government authorities Development partner	Mobilization of farmer groups for trainings Farmer friendly loans or free funding to construct houses Get farmers to contribute some money for their training Help farmers to plan for the small space properly

Constraints	What is it related to?	What is already being done?	What more can be done?	Who has to do it?	How it can be done?
Poor of knowledge of management practices	Farmers lack of technical aptitudes toward proper husbandry management	Visit nearby farmers and seek advices Trainings on piggery, NAADs sends trainers every Friday (Masaka) Use of local knowledge and experience	Exchange visits to experienced fellow farmers Seek advice from vets Have farmer groups in place and more training	Organized fellow farmers and technical staff(vets) in the area Farmers and trainers from the district Farmers local gov't extension Authorities and NGOs Projects like NKOMA and NAADS	Farmers should also become more active and to pass on information to concerned authorities Farmer exchange visits and farmers demand for service Get technical people from the district Training on treatment of pigs and feed mixing Local government staff should move to farmer Getting water harvest tanks Water ponds/dams Piped water Link farmers to specialist on IGA through farmer groups Mobilization of farmers in group forming through local leaders Take on casual jobs to raise capital Borrow funds from groups or institutions
Lack of water	Scarce water	Water harvesting with water tanks	Tarpaulin water collecting technology Increase water accessibility	Farmer Government	
Lack of funds	No fund to buy feed or drugs	Get loan from VSLA Sale of the animals and good relation with vet	Trainings on other income generating ventures in the home Form farmer groups and get loans from village savings association	Farmers District veterinary authorities NGOs	

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