

Characterization of the livestock production system and the potential for enhancing productivity through improved feeding in Tetugu village, Lira District, Uganda

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Methodology

A feed assessment tool (FEAST) was used to assess livestock production and local feed resources in Starch Factory–Tetugu Village, Starch Factory parish, Adyel division in Lira municipality, Uganda. The study site is located within Lira municipality, 3 km north of Lira town. The assessment was carried out through a focus group discussion with 24 farmers to get an overview of the farming system and subsequently one-on-one interviews with 13 farmers (8 female, 5 male), selected from those who took part in the focus group discussion, to get quantitative information on farmers’ land holdings, crops grown on the farm, animal feed purchases, income from milk and livestock sales. The 13 farmers were selected to represent the three land endowment groups in the village (small, medium and large; with at least three from each group). The focus group discussion and individual interviews were done on 10th February 2015 and 25th-27th February 2015 respectively. The highlights of the assessment were categorized into farming systems, major income sources, management of livestock species and constraints and opportunities within the system.

Results and discussion

Farming system

The farming system in this area is primarily a mixed crop/livestock system focusing on annual food crops and livestock like goats and pigs which do not require a large area of land. Households are composed of approximately six members. Land for cultivation is generally not sufficient and decreasing in availability, due to urbanization, changes in land use patterns and increase in the human population. Common crops grown in this area include maize (*Zea mays*), cassava (*Manihot esculenta*), soybean (*Glycine max*), groundnut (*Arachis hypogaea*) and common bean (*Phaseolus vulgaris*) (Figure 1). The customary land tenure system is the most common form of land ownership with a few cases where land is acquired through purchase from indigenous owners. Most of the village members carry out farming on either rented or ancestral land in far-off villages from Lira town.

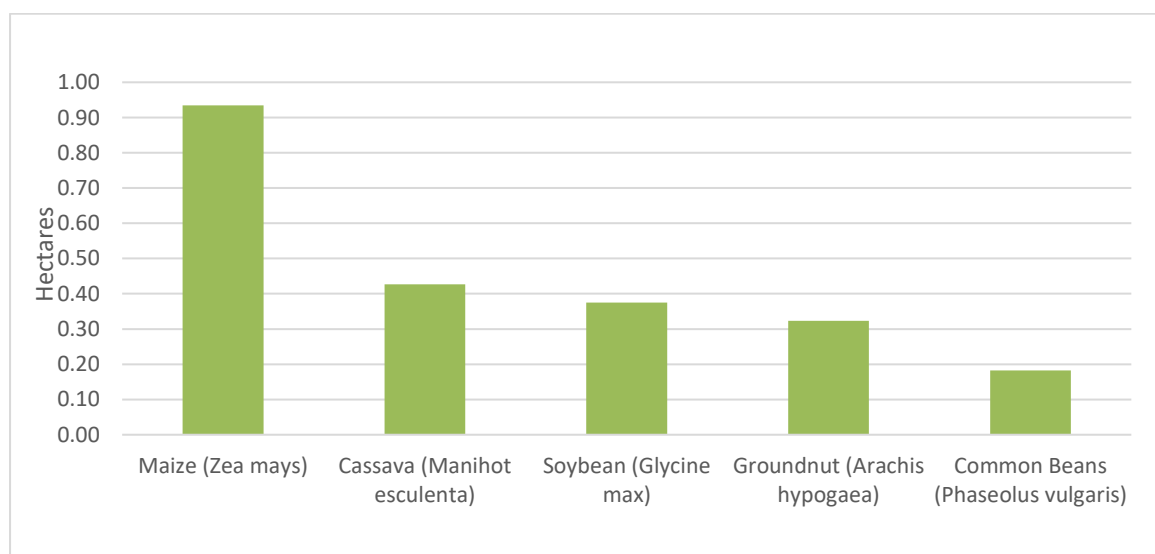


Figure 1: Average area of land utilized for major crops grown in Starch Factory-Tetugu village

Rainfall pattern, availability of water and irrigation

The area has a bimodal rainfall pattern with two rainy seasons, the first running from March to June, with a dry spell from end-June to mid-July (Table 1). The second rainy season starts from mid-July and ends in November. The main dry season is mostly experienced between the months of December and February. However, due to climatic change, slight variations in the amount of rainfall are frequently observed at the onset of the first and second rainy seasons, during the months of March and July respectively. Rainfall levels are generally adequate to support cropping activities, but the rainfall pattern is increasingly becoming unpredictable.

The major sources of water in the area include boreholes, piped water and protected springs, which are available throughout the year. Rainwater is another source but it is available only in the rainy season. Water for livestock is available from the above-mentioned sources which are within the reach of most farmers, with the furthest distance being about 1.5 km. About 20% of farmers practise irrigation at a very small scale, using mostly rudimentary equipment such as buckets and watering cans, to produce mainly leafy vegetables and tomatoes.

Table 1: the main seasons of the year in Starch Factory–Tetugu village

Season	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
First rains												
Second rains												
Dry season												

Livestock types and primary uses

Households keep the major livestock species (cattle, goats, pigs and poultry) for various purposes (Table 2; Figure 2). Cattle are kept mainly for milk and cash income from animal sales, especially of castrated bulls. Improved dairy cows are kept by about 1% of households, while local dairy cows and fattened cattle are kept by about 2% of households, with an average of two cows per household. Pigs and goats are raised by 20-30% of households. About 65% and 1% of households keep indigenous and commercial chickens respectively, to meet household meat, egg and cash needs (Table 2).

Table 2: Livestock types, uses and ownership levels in Starch Factory-Tetugu village, Lira district

Livestock type	Primary uses	% households owning type	Animals per household
Local dairy cows	Milk and meat	2	2
Improved dairy cows	Milk and meat	< 1	1
Pigs	Income generation and manure	20	10
Sheep	Income generation	3	2
Goats	Income generation	30	5
Poultry - Village	Consumption and income generation	65	7
Poultry - Commercial	Income generation	1	10

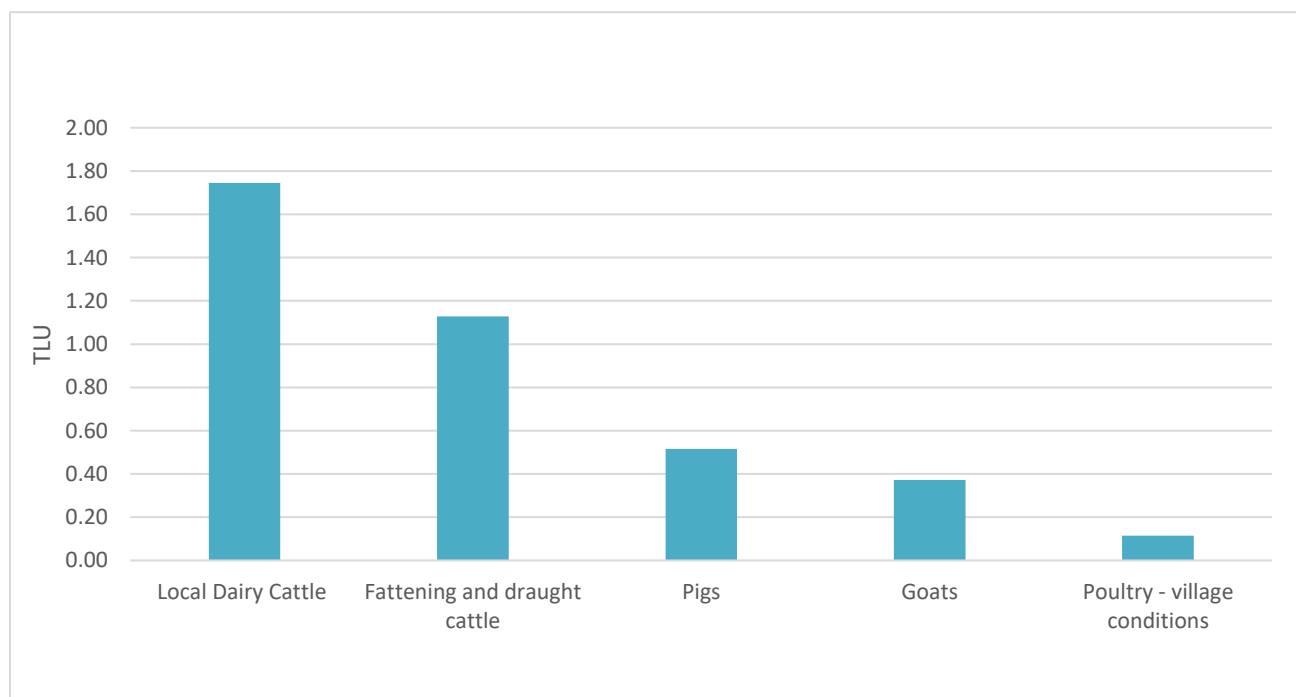


Figure 2: Average livestock holdings per household in Starch Factory-Tetugu village

Classification of pig farmers

Pig farmers in this area fall into three categories: small-, medium- and large-scale farmers, owning 1-2, 3-7 and more than 7 hectares respectively. The majority of pig-keeping households are medium-scale farmers with an average of 5 hectares (Figure 3).

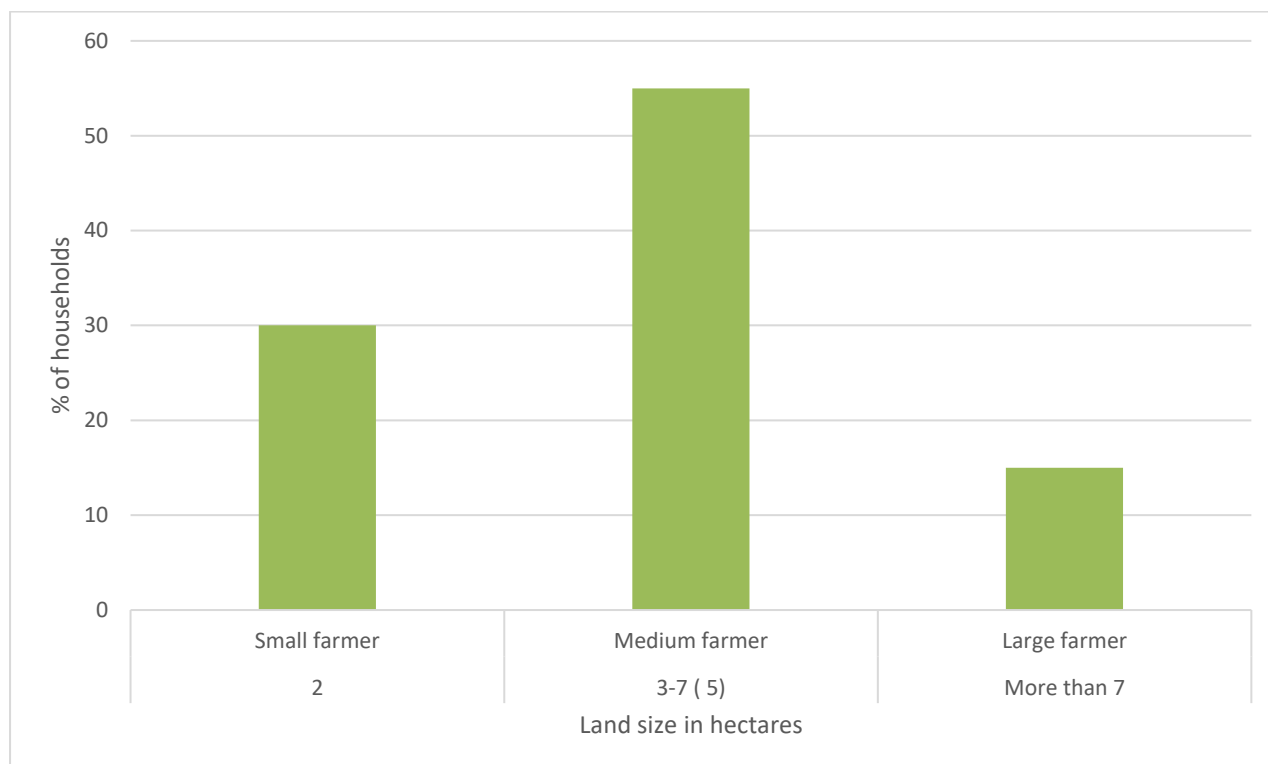


Figure 3: Average land size owned by different categories of pig farmers in Starch Factory-Tetugu village

Major sources of income, credit and labour

Major sources of income for households include the provision of human labour for hire, house rent collection, livestock sales, remittances, businesses and agriculture. The contribution from these various sources to total household income varies, with hired labour contributing the most, followed by house rent collection and livestock sales (Figure 4). Due to the area's location on the outskirts of Lira town, household members provide general and specific labour services to the town against payment. House rents are one of the major income sources for the village and the area is witnessing rapid urbanization, with a shift in land use from agriculture to the construction of commercial and residential houses. The declining land area allocated to crop production explains the small contribution of agriculture to total household income. Labour is generally available throughout the year. The cost of labour varies from UGX 2000 – 6000 (USD 0.6-1.8) per day depending on the nature of work and skills involved. Farmers also hire labour for pig production, though most of the activities are executed by family members. Both formal and informal credit sources are available in the area with 85% of respondents accessing informal credit as the main source for financing livestock and/or cropping activities. The informal sources include a village savings and loan association, rotational savings and borrowing from friends and relatives; formal sources are commercial banks and

microfinance institutions. Respondents noted that access to both types of credit requires some preconditions such as membership, guarantors and collateral. However, informal sources do not have very rigid procedures compared to formal sources. Both formal and informal sources are available throughout the year. Some 62% of the focus group discussion participants had attempted to get credit in the last two years.

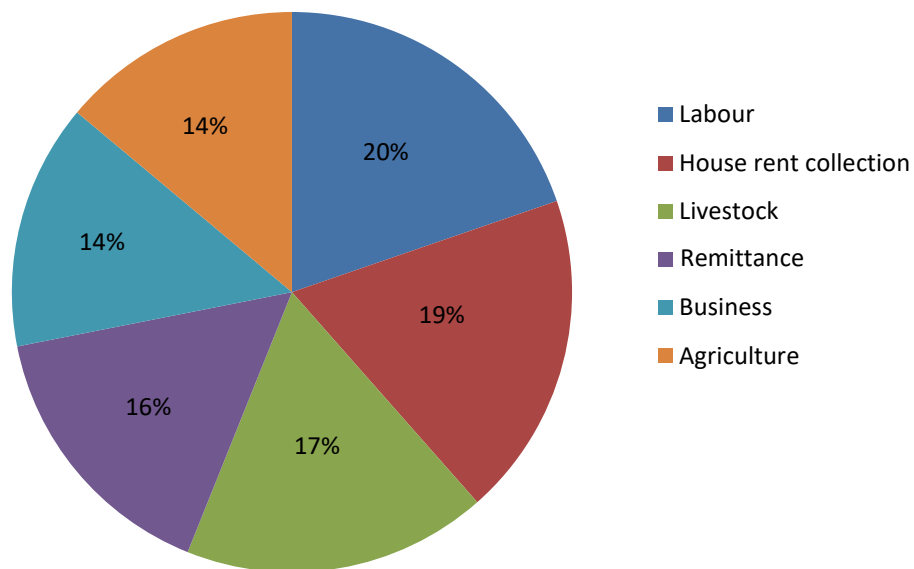


Figure 4: Contribution (%) of livelihood activities to household income

Management of livestock

Management practices for most of the livestock species are broadly similar between households. Pig farmers generally practice intensive systems with few cases of free-range management, where pigs are left to move freely to scavenge for food and water. Dairy cattle are kept under intensive systems, while goats and local cattle are tethered, and local poultry are kept under a free-range system. The intensive system of rearing involves tethering and stall feeding throughout the day.

Major sources of feed for livestock under this system include forages, especially crop residues, and kitchen waste. Private and government veterinarians are the most important animal healthcare providers available to farmers in the area. Most farmers accessed veterinary services from government-employed staff under the National Agriculture Advisory Services (NAADS), but ever since NAADS became inactive farmers have resorted to private veterinarians from other areas. Castration, deworming and treatment against worm infections, cough and African swine fever are the most common animal health problems of pig production in the village. Services are provided at a cost of UGX 4000 (USD 1) per animal. Very few farmers own boars and the majority of farmers hire boars when their sows are ready for service. The boar owner is paid in kind with one piglet, equivalent to UGX 50,000 (USD 13.6), on condition that the sow successfully farrows. Farmers reported transmission of sexually transmitted infections and other pig diseases as one of the problems associated with the communal boar service.

The market prices of pigs vary by size, breed and season. Castrated boars of crossbreeds tend to sell at a higher price of UGX 350,000-400,000 (USD 95-109). Farmers sell most of their boars when they have reached a mature weight and have lost their boar taint (the offensive odour or taste that can be evident during the cooking or eating of pork or pork products derived from non-castrated male pigs once they reach puberty). Sows are also sold for UGX 300,000-350,000 (USD 82-95) and gilts for UGX 100,000-150,000 (USD 27-41). Cattle, goats and sheep are sold at UGX 900,000-1,200,000 (USD 245-326), UGX 50,000-100,000 (USD 13.6-27), and UGX 100,000-150,000 (USD 27-41) respectively, depending on size, and with no major differences due to season of sale.

Availability of feed

Concentrates (mainly maize bran) are available throughout the year, compared to other feed sources such as green forages, kitchen waste/swill, cereal and legume crop residues, as shown in Figure 5. This shows the availability of feed resources and rainfall over an average year. Rainfall was estimated by farmers on a scale of 1-10 where 10 is abundant and 1 is very scarce. Similarly feed availability was estimated by farmers on a scale of 10-100 where 100 corresponds to abundant feed available and 10 denotes very little feed. Concentrates constitute the largest part of the diet followed by green forages, kitchen waste/swill, cereal and legume crop residues, but their contribution reduces in the dry season and the first rainy season. In both dry and wet seasons, larger quantities of concentrate are fed to the animal because it is the most available feed which farmers use in the stall feeding system of livestock management.

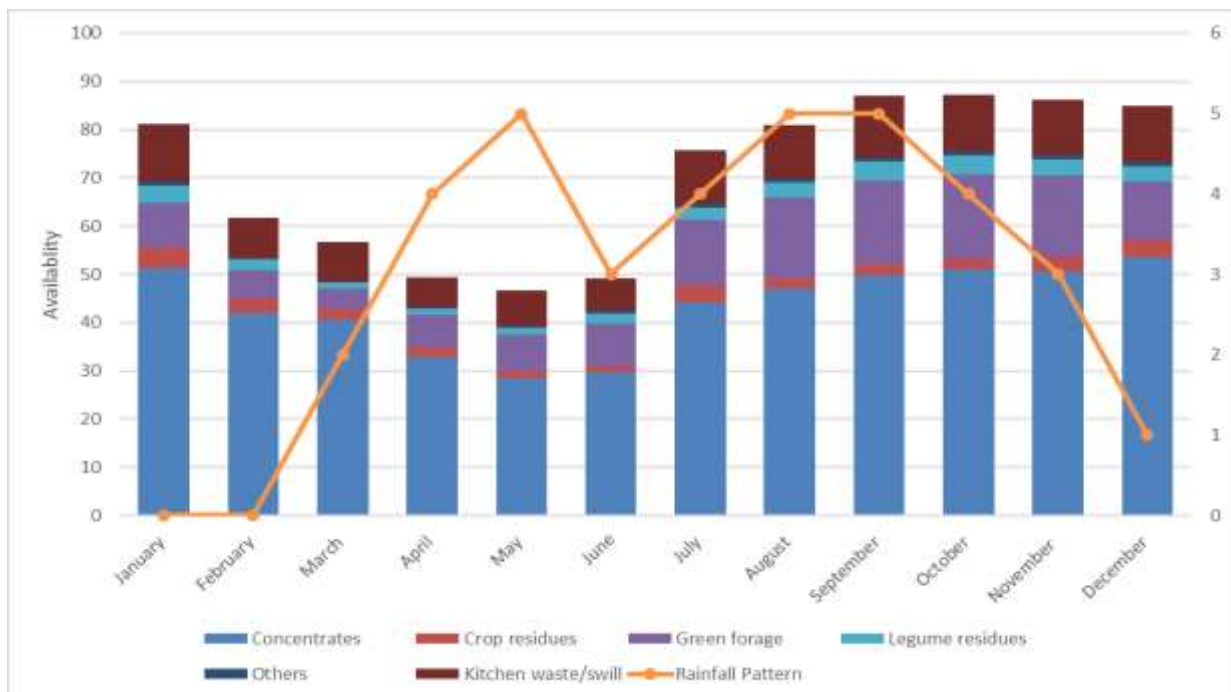
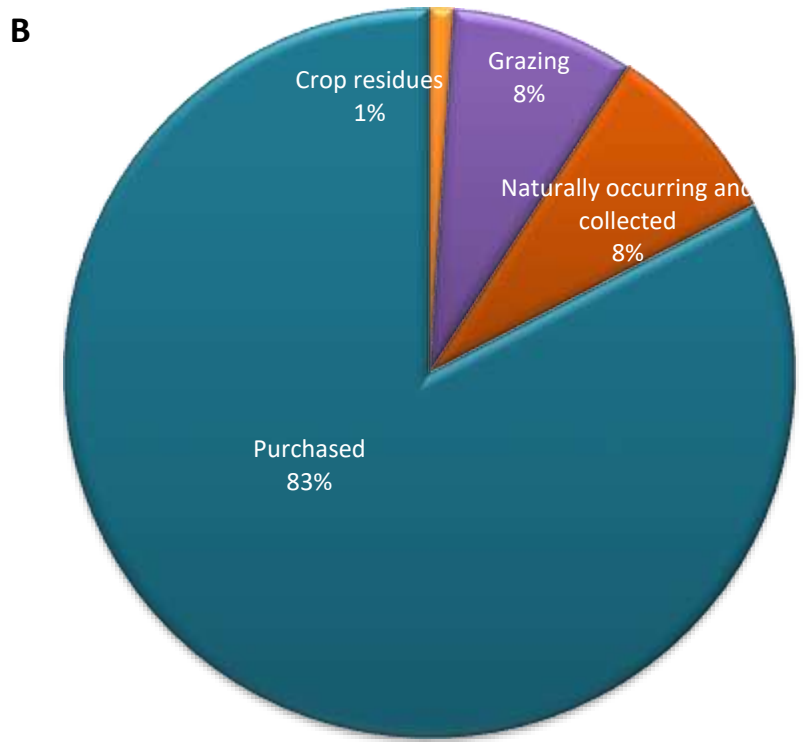
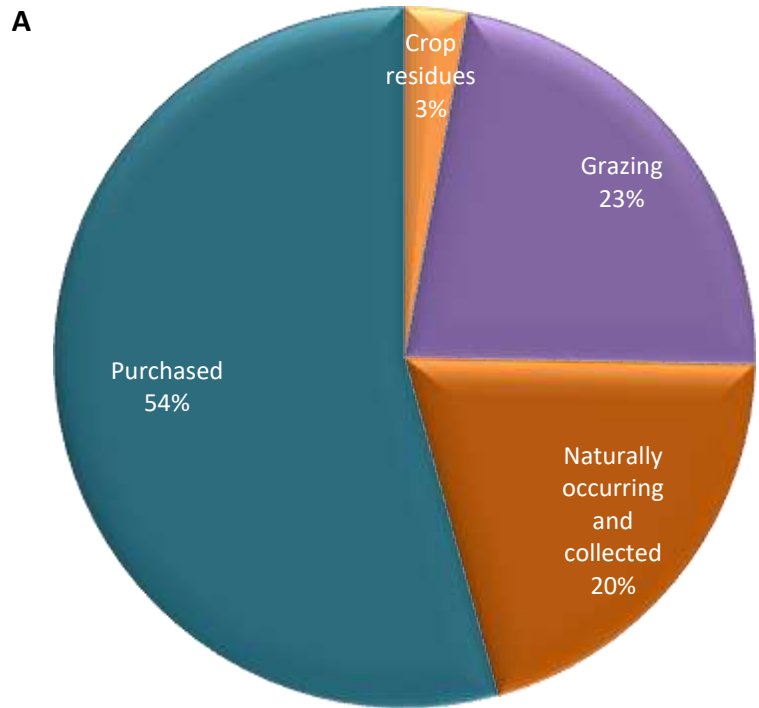
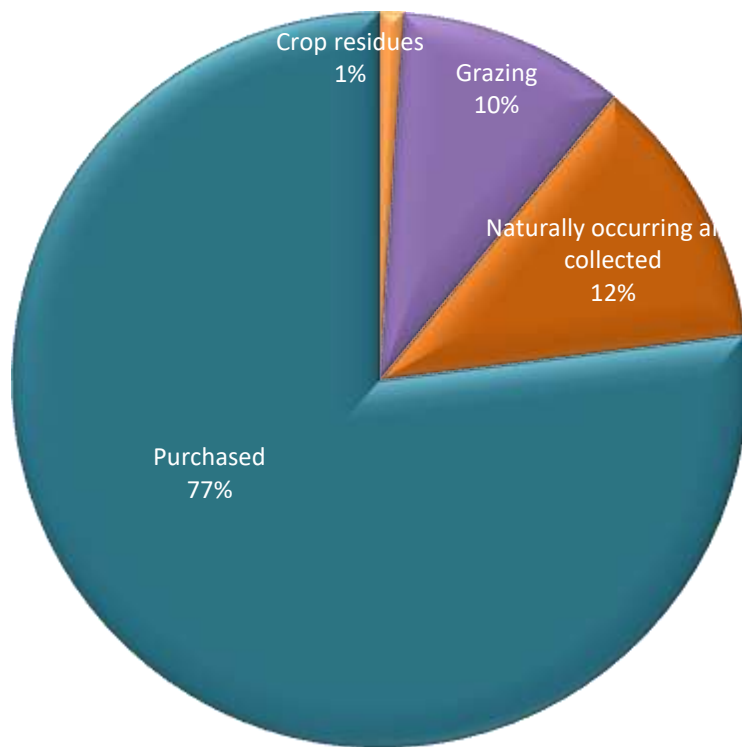


Figure 5: Feed availability in Starch Factory-Tetugu village throughout the year in relation to rainfall pattern

Purchased feeds contribute the largest proportion of the feed on a dry matter basis (Figure 6A) and also on a metabolisable energy and crude protein basis (Figures 6B and 6C). Maize gluten with bran is the most important purchased feed resource in the area. Naturally occurring feeds and crop residues such as cassava and waste cabbage leaves are also important sources of feeds (Figure 6D).



C



D

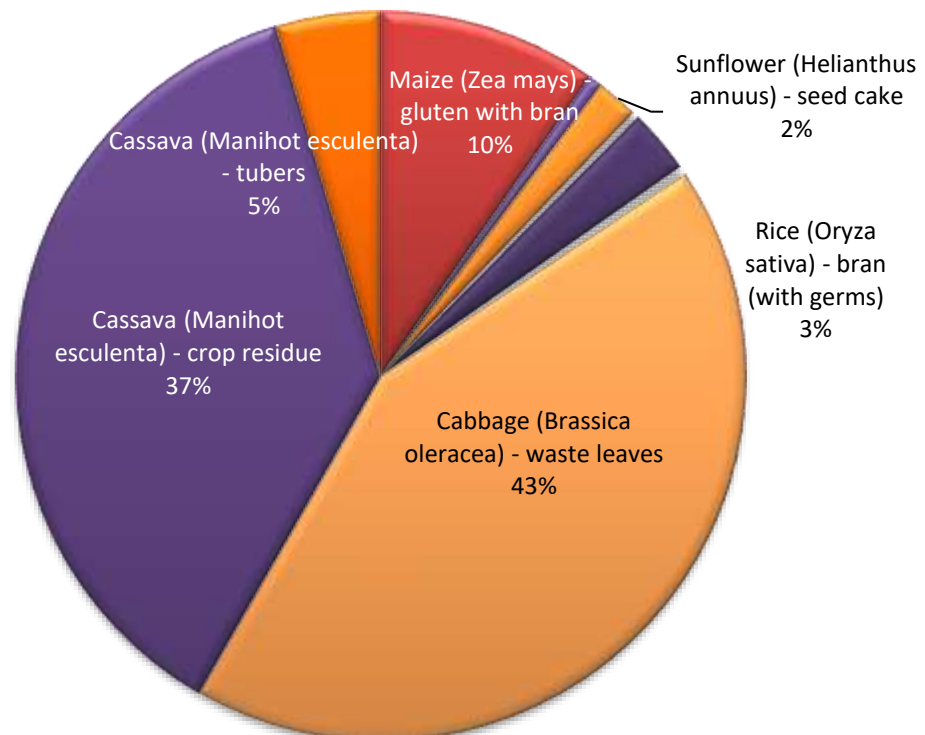


Figure 6: Contribution to dietary requirements in the study area; A - dry matter; B - metabolizable energy; C – crude protein and D - quantities of feed purchased over the last 12 months

Key challenges and suggested interventions

According to farmers, the main challenges to pig production are high prevalence of African swine fever, inadequate and poor-quality feeds, improper housing for pigs and poor marketing arrangements. Farmers reported limited knowledge of disease prevention and control measures. The free-range system of pig management practised by some farmers is another contributing factor to the spread of African swine fever, since the pigs eat leftovers from neighbours' backyards and offal of pork, where the possibilities of contracting infections are high.

Feed is a major constraint, especially to farmers who are practising zero-grazing and stall feeding. Farmers rely heavily on maize bran as one of the most accessible and available concentrates for feeding pigs. No grain mill exists in this village and pig farmers obtain maize bran from industrial plants in Lira town. Due to the seasonality in the supply of maize bran, adequate feed availability is a serious constraint during the March-June period when the maize stock from the previous harvest is almost depleted. This leads to scarcity and consequently high prices for maize bran. Alternative sources of feed are crop residues, and kitchen waste/swill, which also vary with season and are usually limited in quantity/supply and are also of unknown nutritive values.

Limited knowledge on how to construct pig pens was cited as the third most important constraint to pig production. Respondents also mentioned limited resources to construct durable and appropriate pig pens which could also help curb the spread of infections. Poor marketing was the fourth most important constraint as farmers lack proper marketing channels for their pigs. Respondents also highlighted the exploitative role of pig traders who fix prices, not always in the interest of the farmers. Some farmers, because of these low prices offered by pig traders, are compelled to keep their pigs longer despite them having reached market weight, in the hope of getting better prices in future. The fifth constraint reported by respondents is the theft of live pigs from the farm.

Table 3: Key challenges and suggested interventions by farmers

Rank	Challenges	Suggested interventions by farmers
1	High prevalence of African swine fever	Training farmers on proper pig management Improving arrangements for boar service
2	Poor quality feeds	Training farmers on feed formulation and use of available feedstuffs. Establishment of feed processing centre that sells feeds at affordable prices.
3	Inadequate knowledge to construct pigsty	Financial and technical support to farmers towards the construction of pens (on credit)
4	Uncoordinated activities	Establishment of a farmers' network with reliable traders. Group marketing and advertising of farmers' products for sale.
5	Theft	Drafting and enforcing by-law against theft of livestock Construction of proper housing

The combination of pig diseases and poor housing for pigs and poor quality, scarce and expensive feed during certain months of the year put farmers in a difficult position to realize high productivity of their pigs. Farmers are under the mistaken belief that pig diseases such as African swine fever can be prevented by vaccination. To alleviate disease constraints farmers should be trained on proper pig husbandry practices to cover pig housing, feeding practices, maintenance of hygiene and preventive measures for various pig diseases.

To reduce feed constraints, it will be necessary for farmers to first recognize and make optimal use of the locally available feedstuffs in addition to concentrates. This calls for an assessment of the nutritive value of locally available feed resources and developing a feed formula that meets the nutrient requirement of different pig types and age groups, in addition to the method of feed preservation.

Given the seasonality in the supply of maize bran, farmers also have the option to purchase larger quantities during a period of surplus and store for use in periods of low supply. However, this will require increasing farmers' knowledge of proper storage practices and appropriate storage facilities that keep the nutritive value of the feed intact during the storage period.

Conclusions

The farmers in Starch Factory-Tetugu village predominantly practice a mixed farming system focusing on fast-maturing food crops and livestock such as goats, pigs and dairy cattle, which do not require large land areas for production. Livestock and crop sales are the primary agricultural contributors to household income, while pigs are the most important livestock species. The area is currently experiencing problems of poor management and inadequate measures for prevention of common pig diseases, especially African swine fever. Improved pig production is further constrained by a lack of feed sources (both in terms of quality and quantity) to meet nutrient requirements for pig production.

To mitigate these challenges farmers (and other stakeholders) will be required to take an integrated approach to improve pig husbandry practices to cover pig housing, feeding practices, maintenance of hygiene, marketing and preventive measures for various pig diseases. To reduce feed constraints it will be necessary to improve feed production through the utilization of other crop residues and kitchen waste, which tend to be in excess supply during certain months of the year. This calls for an assessment of the nutritive value of the feed resources available to pig farmers and developing a feed ration that meets the nutrient requirement of different pig types and age groups, in addition to appropriate methods of feed preservation.