

# Nutritious and affordable sweetpotato based silage: the feed solution for small-scale pig farmers

In Uganda, researchers are developing innovative business models to promote and commercialize sweetpotato silage. This is expected to transform production and utilization of sweetpotato vines and roots to attenuate the constraint of livestock feed shortages.

## What is the problem?

In Uganda, quality commercial concentrate pig feeds are expensive, while other locally available feeds are seasonal in nature and often of poor quality. Feed accounts for about 62% of the total production costs in pig farming and the problem is further compounded by farmers' limited knowledge of supplementation strategies. To mitigate feeding costs, farmers often resort to using locally available feed resources, e.g., crop residues, plant leaves (*Ficus natalensis*), swill and kitchen leftovers to feed their animals. Sweetpotato makes up about 20% of total crop residues provided by roots and tuber crops and farmers in Uganda currently feed an estimated 1.9 - 2.7 kg per day of sweetpotato residues to pigs. However, sweetpotato vines, which are the most commonly used form of fodder, are highly perishable and seasonal in nature.

Silage (fermented, high moisture stored fodder) is a relatively easy and affordable technology that farmers can use to conserve roots and vines for feeding pigs in times of scarcity and helps cope with seasonal feed prices fluctuations that many smallholder pig producers experience. Cost-effective sweetpotato silage recipes were developed and tested in Kenya during Sweetpotato Action for Security and Health (SASHA) Phase 1 project. Silage provides an opportunity to reduce waste in urban markets and at the household level can open up business opportunities for youth and women. However, the technology is not known amongst smallholder producers and has not been validated under Ugandan conditions.

## What do we want to achieve?

Research on sweetpotato silage is one of the four projects under the umbrella of RTB-ENDURE, a 3 year project (2014-2016) implemented by the



Fig. 1 New silage recipes being tested

CGIAR Research Program on Roots, Tubers and Bananas (RTB). This project aims to: (i) investigate options for silage making and supplementation; (ii) identify gender responsive models for organizing value chain actors to produce, conserve and market sweetpotato based feeds; (iii) strengthen existing linkages between pig farmers and sweetpotato traders; and (iv) build business capacity for profitable silage making and pig raising by December 2016. Our challenge is to integrate sweetpotato and pig production systems and demonstrate its benefits, in terms of increased productivity, affordable costs and savings in labour use, to smallholder and commercially oriented Ugandan livestock farmers-- especially women, who play a major role in pig production. Building on experience generated with partners in Kenya, we conduct adaptive participatory research with pilot farmers and youth entrepreneurs to test and validate the technological and economic feasibility of sweetpotato silage production and marketing as well as best-bet options for the organization of the value chain in Uganda. The expected research outcomes of this initiative are:

- Decreased postharvest losses (50% average reduction in the amount of wasted vines by pilot farmers and utilization of at least 20% of non-marketable roots for silage);
- Increased shelf-life of sweetpotato residues (shelf-life of vines extended to at least 1.5

AUG  
2015

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months and pilot farmers able to feed pigs on silage for at least 3 months in a year);

- Increased profitability (5% of pilot farmers selling sweetpotato silage, 20% savings on purchased pig feed cost and 20% average increase in pigs' weight gain);
- Initial adoption of the technology (50 additional male and female farmers around the demonstration centres feeding pigs with sweetpotato silage and one farmer/entrepreneur in each project site starting a silage making business);
- More equitable distribution of benefits between men and women in the pilot households (at least 20% of women involved in more profitable nodes of the chain and at least 30% of women perceiving greater control over income).

The long term development goal is to improve food, nutrition and income security of at least 250,000 pig and sweetpotato producers through integration of the two commodity chains and enterprise diversification by 2024.

#### ❖ Where are we working?

We are currently working in Kamuli and Masaka districts in Uganda. Our intention is to scale the technology up and out within East and Central Africa.

#### ❖ How are we going to make it happen?

Since December 2014, we are validating sweetpotato-based silage using various combinations of roots, cassava flour and legumes (*Gliricidia* and *lablab*) at Makerere University. These results will form the basis of on-station feeding trials at Mukono Zonal Agricultural Research and Development Institute (MUZARDI) to evaluate best supplementation strategies based on sweetpotato silage as a basal diet. This will then pave way for 16 on-farm trials with selected farmers in Kamuli and Masaka. Research is also being conducted at Uganda Martyrs University (UMU) to determine the best dual purpose sweetpotato varieties and harvest times that will ensure the optimal balance in producing sufficient roots and vines concurrently. Promotion and commercialization of silage will be guided by a business model that focuses on innovation and change in the way silage production is organized. In order to understand economic viability and social acceptability of silage, studies will be conducted to assess farmers' willingness-to-pay for silage as well as profitability of the silage enterprise.

#### ❖ Who are we working with?

We are working with the International Livestock Research Institute (ILRI), the National Agricultural

Research Organization (NARO), Makerere University, Uganda Martyrs University, Volunteer Efforts for Development Concerns (VEDCO), Coalition for Health, Agriculture and Income Networks (CHAIN)-Uganda, Pig Production and Marketing (PPM) and farmer organizations.

#### ❖ What have we achieved so far?

We have adapted and developed protocols to guide silage making and pig feed supplementation. Ten treatments have been tested on sweetpotato silage and supplementation regimes and organoleptic results have been generated while proximate analysis is being carried out on the samples to assess the nutritive value of each treatment (Fig. 1). Trials on dual purpose varieties that would best fit within farming systems in Kamuli and Masaka are also underway, while 16 pilot farmers (50% female) who will host the on-farm feeding trials have been profiled and have established sweetpotato gardens. A protocol to assess existing feeding practices has been finalized and the data collection tools pretested and a training manual and guide developed, as well as various communication products, all of which will be shared on the Sweetpotato Knowledge Portal. Thirty extension staff and model farmers (25 male, 5 female) have been trained as trainers in silage making. Project partners and farmers have joined existing local and national pig platforms where they are kept abreast of pertinent issues in the sub-sector.

Three master's students are undertaking research to complement the research agenda. One student is evaluating pre-screened sweetpotato germplasm for biomass production under different cropping regimes and their potential as dual-purpose varieties in Uganda (Fig. 2). A second student is testing low-cost, sweetpotato silage based recipes with smallholder farmers while a third is assessing the demand and acceptability of sweetpotato silage as pig feed in Uganda.

#### ❖ What's next?

We are embarking on training of pilot farmers followed by youth entrepreneurs in silage making and feeding. On-station feeding trials are about to commence which will quickly be followed by 16 on-farm trials and economic studies to assess the potential for commercialization of silage. Farmers' demonstration centers will soon be established and equipped. A gender-aware baseline survey is being planned and the survey findings will be used to strengthen the gender strategy.



❖ Fig. 2 A Kamuli sweetpotato farmer holding roots after harvesting

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