

Exploiting sweetpotato as an animal feed in East Africa

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Sweetpotato offers great potential as animal feed. But in contrast to China, where 25-30% of sweetpotato is used as animal feed, its potential as feed or as a dual purpose crop (food and feed) has not been fully exploited in Sub-Saharan Africa. Early results from this project have identified “best bet” varieties for dual purpose and forage uses with pigs and dairy cattle, along with promising silage blends for boosting feed supply and nutrition.



Central Kenyan farmer supplementing calves with sweetpotato vines (credit: EADD feeds team).

What is the problem?

Per capita consumption of livestock products in East Africa is the highest of any of the regions of Sub-Saharan Africa (SSA). East African smallholders engage in dairy, pig, and dual-purpose goat (meat and milk) production. However, high population pressures have increased the competition for grains between use as food or as livestock feed. The problem is compounded by a lack of quality feed year-round, with major shortages during the dry season that severely affect the lactation cycle.

Quality feed concentrates are too expensive for many farmers, so they use mixed crop and livestock systems that draw heavily on locally available feed ingredients. For example, pig farmers in Kenya currently use commercial feed as a protein source and supplement it with sweetpotato vines and low quality maize. Dairy farmers rely on Napier grass as a primary feed. However, Napier grass requires a significant allocation of land and has been hit by a

recent outbreak of disease, which has added urgency to the need for alternative feeds and more productive systems.

Increased use and production of sweetpotato as animal feed may be an important part of the solution. Sweetpotato vine provides more protein and dry matter per unit area than other staple feeds and requires less land to produce. Kenyan researchers have found that 4 kgs of vines on a dry matter basis could replace 1 kg of dairy concentrate. However, little land is allocated to sweetpotato production due to a lack of awareness of its potential and the lack of appropriate varieties for feed.

What do we want to achieve in the first five years?

Our challenge is to integrate enhanced sweetpotato production with improved livestock productivity to the benefit of smallholders and, ultimately, consumers. To accomplish this, we need the right kind of dual purpose (bred for both animal feed and human consumption) or forage varieties (vines only). We also need to increase knowledge of how to integrate them into existing livestock systems of the African highlands to improve farmers' profits and product quality.

The first step is to evaluate improved animal feeding systems using sweetpotato in East Africa. Building on its vast experience using sweetpotato as animal feed in China, CIP is guiding adaptive participatory research to test the economic feasibility of using sweetpotato vines as silage and leaf protein supplements as part of feeding regimes. A computer model simulation on livestock feeding strategies, LIFE-SIM, is being used to determine appropriate feeding regimes to test, based on the availability and cost of feed resources during different seasons.



Partners include: East African Dairy Development:

- Heifer International
- International Livestock Center
- Technoserve
- Africa Breeders Services
- World Agroforestry Centre

University of Nairobi, Department
of Animal Production
Egerton University
Farmer's Choice
Rwanda Agricultural
Board/Research

The dairy components of this research are being conducted directly with farmers participating in the East African Dairy Development (EADD) Project. The pig component is working with pig producers contracted by Farmer's Choice, the largest pork product manufacturer in East Africa. Thus, results from this 3-year research effort will be immediately available to users.

✦Where are we working?

In Kenya, six sites were selected for on farm trials, three each from high and medium altitude areas (2 and 1 site each in the wet and dry zone respectively). These are located in central, south, and north rift valley regions of Kenya. On farm experiments to model and test novel feed production and feeding strategies based on optimizing sweetpotato-legumes-other feed resources for pig and dairy production are being conducted in Maragua, Kirinyaga and Embu districts in central Kenya. They are within a 150 km radius of the city of Nairobi, where the Farmer Choice's factory is located. The on-station silage trials to adapt simple, low-cost, preservation techniques using sweetpotato roots/vines and other feed resources are located at the University of Nairobi.

Six sites were selected for on-farm trials in Rwanda: one site in an intensive production area, two in semi intensive, two in agro-pastoral, and one in a purely pastoral system. These are located in Nyagatare, Rwamagana, and Gatsibo districts of the Eastern province.

✦How are we making it happen?

Two MSc students are evaluating pre-screened sweetpotato germplasm for biomass production under different cropping regimes and their potential as dual-purpose varieties in Kenya and Rwanda. A third student is adapting simple, low-cost, silage-making techniques using sweetpotato roots and vines, legumes, and other feed resources. A fourth student is modeling and testing new feed production and feeding strategies based on optimizing sweet potato-legumes-other feed pig and dairy interactions.

In Kenya, on-farm dairy feed experiments are hosted by farmers' groups. The groups have screened six varieties in six sites for yields, harvesting stages, and farmer preferences. Data have been collected on climate conditions, soil and forage nutrients, forage and root yield, and farmer and cow preferences. Eight varieties are currently being screened in Rwanda.

For the pig feed, participatory on farm trials are being conducted with farmers (3 women, 6 men) in central Kenya. They are testing feeding strategies based on sweetpotato vines and combinations with other feed resources for pigs. A total of 20 local researchers and dissemination facilitators have been trained on the LIFE-SIM model that will be used to model and test feeding strategies. On station silage experiments have evaluated alternative silage blends using roots and vines. Silage was harvested 75 and 150 days post planting, and it was prepared in mini silos comprising two additive levels and four different maturing levels. These were measured for forage and root yields and for nutrient compositions.

✦What have we achieved so far?

In Kenya, Gweri and Kemb 35 were identified as most promising for forage. Two other varieties (NASPOT-1 and Wagabolige) have been identified as "best bet" dual purpose varieties and another (103001.152) for good root but poor vine production. Varieties performed well across different agro ecological zones, ensuring that farmers in each zone have at least one suitable dual purpose variety. Farmers will have to make tradeoffs in choosing between forage, dual purpose, and root varieties depending on feed needs on farms. It is likely that farmers facing acute feed shortages will opt for forage or dual purpose varieties. On-station silage experiments have demonstrated the potential for silage additives like cassava meal, maize meal, and molasses as blends with sweetpotato silage using roots and vines. The experiments also produced promising proportions of roots and vines for pig diets and also as a blend with other locally available feed resources.



■ Carlos Leon-Velarde demonstrating how to make and package silage

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