Smallholder pig producers face a number of constraints in the areas of health, feeds, breeding and marketing in developing their enterprises. The high cost and poor quality of commercial feeds, and a lack of low-cost local alternatives, prepared from amply available cheap ingredients found on farms, is probably the major constraints facing smallholders pig producers. This situation is aggravated by seasonal changes in the environment causing fluctuations in feed quantity, quality and price. Consequently, farmers engage in opportunistic and inadequate feed practices. ILRI has undertaken a number of feed-related interventions designed to alleviate some of the above constraints, including:

- Testing of diets comprising local feed resources on pig performance;
- Increase of the use of nutritious forages in the pig diets; and
- Use of supplemented sweetpotato silage.

**Aims**

Summarize the nutritional value and seasonal availability of locally available pig feedstuffs.

- Compare the productivity of pigs fed on commercially prepared diets versus silage-based or forage-based diets.
- Develop balanced low-cost diets for local and crossbred pigs using seasonally available local feedstuffs.

**Intervention sites**

The Masaka and Mukono districts of the Central Region, Uganda

**Approach**

This approach helped determine and document the seasonal availability, relative importance and nutritive content of 43 local resources through the use of proximate analysis and a rigorous literature review. Three diets were tested using these feedstuffs: commercial, forage-based and silage-based diets. Local ingredients, grown rather than purchased, were used in the formulation of these diets to take into account feed cost constraints experienced by smallholder pig producers. The local ingredients used included: avocado, banana leaf, cassava leaf, cotton seed meal, jack fruit, maize bran, papaya leaf, Mukene (silver fish), sweetpotato vines and roots, limestone, common table salt and vitamin premix. A feeding trial was then undertaken in Masaka at Kamuzinda farm on 90 pigs to test the performance of these diets.

**Key findings**

Feeding commercial diets to newly weaned pigs, and then feeding silage- or forage-based diets to finishing pigs is the most cost effective solution. The poor growth performance of newly-weaned pigs in this study indicates that strategies resulting in increased weaning weights, creep feeding, and the identification of nutrient dense, digestible, palatable feedstuffs and their incorporation into low-cost balanced diets.
Key findings
Preliminary findings indicate that the establishment of the forages was affected by the long dry spells. Of these forages, Brachiaria species established well in all the districts. Farmers indicated that the pigs loved these Brachiaria species. Some species like the mulberry did not establish well.

Impact
This is yet to be assessed since most of the farmers had just established the forages, and for some of them, the yields were poor due to the long dry spells.

Use of supplemented sweetpotato silage
Uganda is the highest producer of sweetpotatoes in Africa (about 2.2 million tonnes/annum). An estimated five tonnes of vines can be harvested in a hectare. It is well documented that sweetpotato vines are the commonest forage fed to pigs by smallholder farmers in Uganda. Most farmers feed sweetpotato vines in a fresh form, making this feed resource available immediately after harvest. They also feed vines without any form of supplementation.

Aims
• Increase the shelf life of the vines through silage making so as to even out the seasonal scarcity.
• Determine the performance of growing pigs fed on a supplemented sweetpotato silage-based diet.
• Develop innovative business models to promote and commercialize sweetpotato silage.

This intervention is expected to transform the production and utilization of sweetpotato vines and roots to attenuate the constraints of livestock feed shortages. Sweetpotato silage provides an opportunity to reduce waste in urban markets, and at household level can open up business opportunities for young people and women.

Intervention sites
The Masaka and Kamuli districts of Uganda.

Approach
The experiments were carried out in Makerere University to determine the best sweetpotato silage combination using different fermenters (maize bran and cassava flour). Then on-station feeding trials were carried out on 48 pigs fed on three silage-based diets and one commercial diet. The best performing diet of supplemented silage at 40% with the commercial feeding ingredients was validated with farmers in Kamuli and Masaka. To increase the awareness of the technology, district extension staff of Kamuli and Masaka were trained in silage making in the hope that they in turn would act as trainers in their respective areas. Smallholder farmers (280 young people, 1458 females and 402 males) were trained for two years in silage production. Two silage business centres were launched in Masaka and Kamuli. Partner organizations attended several agricultural shows around the country exhibiting the sweetpotato silage technology. Two open days were organized in Kamuli and Masaka and the public were invited to witness demonstrations on silage making.

Increased use of nutritious forages in the pig diets

Aims
Identify and use nutritious forages for pig feeding that can be incorporated in the pig diets to improve their nutrition value without fundamentally increasing the cost.

Intervention sites
The Kamuli, Masaka, Hoima and Lira districts of Uganda, in collaboration with local governments.

Approach
Participant pig farmers were asked to plant forage seeds on at least 0.125 acres of land. The varieties were selected on the basis of availability and suitability to local conditions. The forages established are shown in Table 1 below. Having established the forages, ILRI undertook a follow on study in November 2016 to assess the performance and suitability of these forages for pig diets. The farmers were also asked about the challenges they faced in planting and using these forages.

Table 1: Varieties of forages given to farmers established in different districts of Uganda

<table>
<thead>
<tr>
<th>District</th>
<th>Sub-counties</th>
<th>No. of farmers</th>
<th>Varieties established</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masaka</td>
<td>Kabonera, kyanamukaka</td>
<td>36</td>
<td>Mullbery, Lablab, B. Mulato, clitoria, Canavalia</td>
</tr>
<tr>
<td>Kamuli</td>
<td>Bugulumbya, Butansi, Namwendwa</td>
<td>36</td>
<td>Mullbery, Lablab, B.Mulato, clitoria, Canavalia, Bracharia Hybrids Cayman, Cobra and Mulato II</td>
</tr>
<tr>
<td>Lira</td>
<td>Ojwina Division, Adyel Division, Adokokwok and Barr Sub County</td>
<td>12</td>
<td>Trifolium Decorum, Lablab purpureus, Desmodium uncinatum, Lupinus, angustifolius, Demathus vergatus, Trifolium tembese, Desmodium intortum, Vicia vilosa and Stylosanthes hermata.</td>
</tr>
<tr>
<td>Hoima</td>
<td>Busiisi, Kitoba and Kiziranfumbi</td>
<td>14</td>
<td>Trifolium Decorum, Lablab purpureus, Desmodium uncinatum, Lupinus, angustifolius, Demathus vergatus, Trifolium tembese, Desmodium intortum, Vicia vilosa and Stylosanthes hermata.</td>
</tr>
</tbody>
</table>

Impact
Farmers in Masaka were trained on how to utilize the local feed resources using the experimented diets. Some smallholder farmers have adopted these diets and one of the farmers even planted avocado trees to increase feed resources for his pigs.

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Key findings

- The use of sweetpotato vines silage can even out the supply of feed on smallholder pig farms.
- Supplementing sweetpotato silage at a level of 40% improves the growth performance of pigs.

Impact

Sweetpotato silage has reduced feeding costs by 40% and increased sweetpotato vines and roots shelf-life by four months. Sweetpotato silage technology is providing employment to different groups of people, including: young people (Twekembe youth group) making silage for sale; sweetpotato farmers selling vines for silage; and non-governmental organizations offering training on silage making and supplementation. As a result of feeding pigs on silage, pig farmers have increased their herd sizes and incomes.

Conclusions

- More work is still needed, especially in the testing of the nutritional content of the commercially available feed on the markets.
- More studies need on the use of forages supplemented by the limiting amino acids.
- Advocacy work is need on feed quality policy related issues.

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