

## The challenge

Beans are an important source of protein, especially for low and middle-income households, but consumption is constrained by the high energy and water requirements for cooking beans and the long cooking time. In recent years, the rapid expansion of urban populations, rising incomes, and high costs of energy have fueled the demand for fast-cooking processed foods. While canned and frozen beans are available, they are often out of reach for most households due to their high cost and requirement for refrigeration. Developing affordable, convenient, on-the-shelf bean products that require less time, fuel and water to cook, will greatly enhance bean consumption, improve incomes for producers and conserve the environment.

## Objectives

To develop and promote precooked bean products to increase bean consumption, reduce time spent on cooking and create more lucrative markets for bean farmers.

## The solution

- The project developed three precooked bean products: precooked beans that cook in 10-15 minutes, bean flour and a ready-to-eat snack.
  - Bean varieties were screened for their precooking and industrial processing suitability, nutrition content and adaptability in smallholder farms.
  - A precooked bean processing factory was established to produce precooked bean products.
- Two seed supply models were tested.
  - Seed credit model (SCM), involving contracting large-scale farmers on credit who then pay back with cash.
  - Revolving seed model (RSM), dealing with small-scale farmers who pay back with seed.
- Two models for grain supply tested: a community production and marketing system model, and a collective marketing model with seed credit support involving farmer groups.

## Key results

### Increasing production and reducing post-harvest loss

- Pre-screening of 47 bean varieties was completed and 12 were selected for production and industrial precooking based on cooking time, color, micro-nutrient content and agronomic traits for production and processing. Four of the varieties (NABE 4, NABE 14, Rosecoco and Wairimu) are now widely grown by farmers in Kenya and Uganda.
- The 12 selected bean varieties have a yield potential of 1,500-2,000 kg/ha, compared to 500 kg/ha for local varieties.



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### A ready-to-eat bean snack, bean flour, and easy-to-cook bean product have been developed

- 101,393 tons of seed of improved bean varieties has been used by 10,225 farmers (5,220 women and 5,005 men) for grain production.
- 13,650 farmers (6,442 men and 7,208 women) are currently involved in seed production. In Uganda, farmers accessed 71,810 kg of seed through the SCM in four seasons of the project's operation and supplied 880,595 kg for further seed and grain production. Through the RSM, farmers accessed 7,500 kg of bean seed and supplied 102,000 kg of seed. The SCM was selected for scaling up seed production given its potential for production and sustainability.
- Evaluation of the collective marketing model with seed credit support, involving farmer groups, revealed no significant differences in yields or input costs. Through the collective marketing model, 10,225 farmers (5,005 men and 5,220 women) were able to access 57,558 kg of bean seed and supplied 923,781 kg during the course of the project.

### Increasing access to resources, markets and incomes

- The development of precooked products has been completed and three products – the snacked precooked bean, bean flour and the easy-to-cook precooked bean product – are already on the market. The snack is ready-to-eat while the precooked bean product cooks in 15 minutes saving over 100 minutes of cooking time and associated fuel expenditure worth US\$0.505/kg.
- Two production facilities have been established; one in Kisumu (Kenya) and one in Mukono (Uganda). The pilot factory in Kisumu has the capacity to process 9 tons of precooked bean products per day, and the factory in Mukono will enable production to be scaled up to ensure mass availability of the products.
- Consumer acceptance for precooked beans is 89.1%. Households who choose to consume precooked beans will save about US\$0.3 per meal of beans prepared.

## Gender equity and empowerment of women

- Gender analysis indicated that both men and women participate in bean production, with men mostly involved in the more energy-demanding activities (bush clearing, land preparation), while the majority of women take part in more time-consuming activities that require tenderness in handling (planting, harvesting, sorting, winnowing and management during storage). Although men do participate, women stand out as the major players in bean production.
- The project has created employment opportunities for men and women farmers producing seed and grain, transporters, those offering casual labor (loading and offloading), and those offering preprocessing services, like sorting beans.
- The introduction of aggregation centers near farmers increased the proportion of women that participated in bean marketing.
- The precooked bean product reduces women's time spent fetching water and firewood, and boiling the beans required for cooking normal beans.
- Women's average incomes from bean sales increased from US\$126 in 2014 to US\$170 in 2016 and the volume of beans sold by women increased by 8%, from 290 kg in 2014 to 314 kg in 2016.
- Access to credit has been improved for 1,418 women through the facilitation and promotion of village savings and loans cooperatives established for bean farmers.

## Capacity and policy influence

- 14,522 farmers (6,667 men and 7,862 women) received training in good agronomic practices that are known to improve bean productivity.
- To encourage good feeding habits for children and women of reproductive age, 52 'lead' mothers were trained to promote healthy eating.
- Through engaging national standards bodies (Kenya Bureau of Standards and Uganda National Bureau of Standards), reference standards were generated to inform policy and the development of other precooked bean products.
- A framework for food assessment to address food safety issues at various levels of the value chain was developed. Food safety analysis through a Hazard

	47 bean varieties screened and 12 adopted for production among farmers
	The 12 selected varieties have a yield potential 4 x greater than local varieties
	13,650 farmers (7,208 women and 6,442 men) now involved in seed production
	Women's average incomes from bean sales increased from US\$126 in 2014 to US\$170 in 2016
	14,552 farmers (7,862 women and 6,667 men) trained in good agronomic practices

Critical Control Point Analysis identified four critical control points and mitigation measures to reduce or eliminate the hazards identified and documented.

## Conclusions and recommendations

- To maximize product uptake, the possibility of fortifying precooked bean products should be investigated further to improve nutritional benefits.
- A number of disparities between men and women with regard to decision-making, power relations over bean production, access to and control over productive resources and use of income from beans were observed. It is therefore important to promote intra-household cooperation to increase production and benefits from bean production.

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