

# FERMENTED FOOD FOR LIFE

A “PRO-POOR” BUSINESS MODEL BRINGS LOCALLY PRODUCED PROBIOTIC YOGURT TO 258,000 EAST AFRICANS WITH POTENTIAL OF REACHING MILLIONS MORE

## WHAT CANADIAN EAST AFRICAN COLLABORATORS DISCOVERED:

- An affordable, dried bacteria that enables local production of probiotic yogurt
- A “pro-poor” business model for reaching millions of consumers
- Improved nutrition for children
- Increased markets for local farmers’ milk
- New job opportunities and income for women and youth

## BY THE NUMBERS

- Nearly 260,000 consumers of probiotic yogurt are reached in Kenya, Tanzania and Uganda.
- 262 production units have been established in Kenya, Tanzania and Uganda which are collectively producing at least 45,000 litres of probiotic yogurt per week.
- School management and parents of 48 pre-primary institutions in Uganda were sensitized on the importance of probiotics. As a result, 2206 children started consuming probiotic yogurt on weekly basis.
- 74% of individually and group-owned production units are led by women, and youth (less than 35 years) present 45% of the people involved in the business of probiotic yogurt in Tanzania and Uganda 561 individuals trained on yogurt production, record keeping, marketing, and procedures for certification by government food safety agencies.
- Teachers and caregivers in 20 early childhood development centres in Kenya trained on production of fermented maize-millet-soybean porridge, serving 1,200 children.
- In Uganda, the net profit of selling one litre of probiotic yogurt is at least 3 times the net profit of selling one litre of fresh milk.
- The project received 145,856 sachets of freeze-dried bacteria.

## THE IMPACT:

Nearly 260,000 children and adults have begun consuming healthy probiotic foods in Tanzania, Kenya and Uganda. Two scale-up pathways were successfully tested. A donor-led model in Tanzania and Uganda supports the local production of yogurt using freeze-dried bacteria sachets. An even more promising model led by Jomo Kenyatta University of Agriculture and Technology (JKUAT) and public authorities in Kenya supported 20 Early Childhood Development Centres in producing their own fermented porridge, which was consumed by 1,200 children on a daily basis. Nationally, there are 50,000 centres in Kenya serving some 3 million children who could be reached by the upscaling of the model. These “pro-poor” value chain-based business models have improved food and nutritional security by increasing the local production, distribution, and consumption of affordable and healthy probiotic fermented foods, notably yogurt and porridge. They have created new markets for farmers’ milk, new jobs, and additional income, primarily for women and



youth. As yogurt has a longer shelf life than milk, post-harvest losses of milk have been reduced, especially in communities with limited refrigeration or lack of an immediate market for fresh milk. Women and youth have been the main beneficiaries. While women contribute almost 70% of the labour in the dairy sector, they had no significant control over resources or incomes. As a result of the project, women reported greater confidence, better access to financing, and greater mobility. Primary school children who consumed probiotic yogurt daily were healthier.

## THE CHALLENGE:

Canadian researchers developed a probiotic yogurt strain found to improve weight gain in malnourished adults and children, reduce skin rashes, fight diarrhea, enhance immunity in HIV patients, and reduce adsorption of heavy metals and aflatoxins in women and children. But this approach relied on small batches of bacteria grown in a laboratory, limiting businesses growth and widespread availability and use of the probiotic. A breakthrough occurred when a Canadian-Dutch team created shelf-stable starter cultures. A one-gram sachet of freeze-dried bacteria can affordably produce 100 litres of yogurt locally within 24 hours, and with a longer shelf life than milk. The rapid turnaround from production to consumption can help overcome the problems of poor distribution channels (e.g., pooling of milk, poor roads, few refrigerated trucks), limited markets for farmers milk, and a lack of home refrigeration, which has limited yogurt production to large companies and consumption primarily to urban areas. An innovative business model was created to allow the local production, distribution, and consumption of probiotic yogurt in rural areas of Uganda, Tanzania, Kenya, and beyond.

## TRANSLATING RESEARCH INTO ACTION

### Building a sustainable business model

*“People wonder how we are in a position to out-compete industrial yogurt. Our secret to them has always been: the product quality and healthy benefits are the master keys.”*

**Kettie Namayanja, who along with her husband Ronald, are part of the Dovek youth group, the leading probiotic yogurt producer in Masaka, Uganda**

- A pro-poor value chain-based business model boosted the local market for milk, increased profits for farmers, provided affordable fermented foods to communities and empowered women and youth.
- All three production models (group, cooperative and individual) were found to be scalable, profitable, and socially viable.
- Jomo Kenyatta University of Agriculture and Technology has signed agreements for development cooperation with five counties in Kenya. These agreements will be exploited to promote the production and consumption of probiotic fermented porridge in pre-primary schools, with the potential to extend to all 47 counties in the country.
- The donor-led FFFL model is being replicated by philanthropic organizations:
  - 663 youth from 33 youth groups (15 in Uganda and 18 in Tanzania) from a separate project funded by Heifer and the Mastercard Foundation (the East Africa Youth Inclusion Program). 21 of those groups have begun producing yogurt (15 from Uganda and 6 from Tanzania).
  - The Lutheran World Federation supported the establishment of 2 production units in Rwamanja, a refugee camp in southwestern Uganda. The entrepreneurs (13 women and 7 males) are producing about 200 litres of probiotic yogurt daily which is distributed and consumed in the camp.
- A strong infrastructure of starter culture has been established. A cross-country network of agro-vet shops in Uganda purchase Yoba culture in bulk and retail it in their respective regions. In Tanzania, sachets are available at several Heifer offices and a women-led philanthropic organization (Mikono Yetu).

- SNV Netherlands Development Organisation has dispersed CAD\$7,839 under a matching grant program for premises and equipment (e.g., refrigerators, motorcycles, and sealing machines) that has benefited 27 production units. The grant contribution will continue after the closure of FFFL project.
- Workshops on quality and safety, as well as ongoing mentoring and coaching, resulted in 80 production units (75 in Uganda and 5 in Tanzania) obtaining a positive certificate of analysis from the Uganda Industrial Research Institute and Tanzania Food and Drug Authority.
- Standardized bookkeeping and management practices introduced for production units, with 60% of units now keeping their own records.
- Partnership models have been key to the project’s sustainability: The Uganda Industrial Research Institute analyzes yogurt samples; the Dairy Development Authority provides monitoring and training services; and the Tanzania Food and Drug Authority provides technical advice on food safety and standards.
- 13 consultants (Local Capacity Builders) were trained to train others in yogurt production and sales.
- Scale up driven by high awareness and endorsement of FFFL by government and institutional authorities.

### **Increased consumption and improved nutrition from probiotic fermented foods**

*“Through Fiti (probiotic yogurt) feeding we are already seeing some significant health improvements in terms of reduced illness and increased weight.”*

#### **Crisis Center of Foundation Karibu Tanzania, which produces 20 litres of yogurt each week**

- Developed a high-protein porridge made from a blend of maize, millet, and soybean, and fermented with the probiotic culture, which children preferred over non-fermented porridge.
- The partnership of Heifer International with SNV Netherlands contributed to a full-fledged program in South-West Uganda, following a successful pilot, which sees parents paying for the yogurt at a subsidized rate. The Pre-Primary Probiotic Program funded by SNV was developed to enhance the consumption of probiotic yogurt in schools.
- A study of 467 primary school children in Uganda found that consuming 100 ml of probiotic yogurt daily can reduce skin rashes, diarrhea, and school absenteeism. A separate study of 177 primary school students in Tanzania found that daily consumption of 125 ml of probiotic yogurt during the weekdays contributed to weight gain (45% of participants). (More thorough research studies are needed to confirm the results.)
- Increased production and consumption benefited from a variety of educational tools, including radio, television, cell phones, a feature film, workshops, personal and group meetings, and diverse partners working in the countries.

### **Informing decision-making**

*“(The project is) quite impactful. It supports the local communities to get access to nutritious foods, yet at the same time it’s improving the income base at the household level.”*

#### **William Matovu, Heifer Uganda Country Director**

- Uganda’s Dairy Development Authority has committed to include training in probiotic yogurt processing in the diary school.
- The Uganda Industrial Research Institute and Tanzanian Food and Drug Authority are supporting certification and nurturing processors to move to scale.
- Prominent figures in Uganda’s ministries of Health and Education promoted the consumption of probiotic yoghurt in primary schools. For example, seven districts in southwestern Uganda officially endorsed probiotic yogurt, and encouraged schools to adopt the program.
- A symposium in Kampala shared the FFFL concept and successes with policymakers, regulators, other philanthropic organizations, and potential donors.

## WHAT'S NEXT?

Several initiatives are underway to scale up the FFFL model:

- JKUAT has signed agreements for development cooperation with five counties in Kenya. These agreements will be exploited to promote the production and consumption of probiotic fermented porridge in pre-primary schools. The potential is significant: Kenya has about 50,000 Early Childhood Development Centres serving three million children.
- The Lutheran World Federation and Finn Church Aid plan to establish more production units refugee camps.
- Heifer's East Africa Youth Inclusion Program is setting up more than 60 youth groups to produce and market yogurt in Uganda and Tanzania.
- Partnerships have been established with the dairy regulatory bodies in Uganda and Tanzania related to licensing and training.
- Discussions are underway with Uganda's Dairy Development Authority to restructure the licensing process for start-up production units to make it easier for entrepreneurs.
- JKUAT is working to identify a suitable company with licence for importing and distributing starter cultures by 2019.
- JKUAT will continue to train interested entrepreneurs as part of its extension program.

## LEARN MORE ABOUT THIS PROJECT:

Project abstract: <https://www.idrc.ca/en/project/producing-more-yogurt-africa-freeze-dried-bacteria>

Project website: <https://www.fermentedfoodforlife.com/>

## KEY OUTPUTS

### BOOK

*Fermented food for life stories of inspiration, struggle & success.* Kayiwa, Alex; Onyango, Arnold; Bazira, Dan; Reid, Gregor; Malisa, John; Kapella, Lazaro; Kanyamala, Maimuna; Owaygen, Marwan; Arinda, Nelson; Westerik, Nieke; Kort, Remco; Rernard, Neema; Ssebandeke, Robert; Sybesma, Wilbert; Matovu, William. (2018) <https://idl-bnc-idrc.dspacedirect.org/handle/10625/57297>

### ACADEMIC PAPERS

*A novel consortium of Lactobacillus rhamnosus and Streptococcus thermophilus for increased access to functional fermented foods.* Microbial Cell Factories 08/12/2015 Kort, R., N. Westerik, L. M. Serrano, F. Douillard, W. Gottstein, E. Ananta, I. M. Mukisa, C. Tuijn, L. Basten, B. Hafkamp, W. Meijer, B. Teusink, W. M. de Vos, G. Reid, W. Sybesma Yoba for Life Foundation, Micropia Natura Artis Magistra, University Amsterdam, TNO, CSK Food Enrichment, University of Helsinki, Makerere University, Wageningen University, Lawson Health Research Institute, University of Western Ontario doi.org/10.1186/s12934-015-0370-x -

*A novel millet-based probiotic fermented food for the developing world.* Nutrients 22/05/2017 Di Stefano, E., J. White, S. Seney, S. Hekmat, T. McDowell, M. Sumarah, G. Reid University of Wageningen, Lawson Health Research Institute, Brescia College, Agriculture and Agri-Food Canada, University of Western Ontario doi.org/10.3390/nu9050529 <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56468>

*Novel production protocol for small-scale manufacture of probiotic fermented foods.* Journal of Visualized Experiments 09/10/2016 Westerik N, Wacoo AP, Sybesma W, Kort R. Yoba for Life Foundation, Vrije Universiteit Amsterdam, Uganda Industrial Research Institute, Micropia Natura Artis Magistra, Netherlands Organization for Applied Scientific Research doi.org/10.3791/54365

*Investigating probiotic yoghurt to reduce aflatoxin B1 among school children in eastern Kenya: preliminary study.* International Dairy Journal 2016 Nduti N.N. McMillan A., S. Seney, M. Sumarah, P. Njeru, M. Mwaniki, and G. Reid. <https://doi.org/10.1016/j.idairyj.2016.07.014>

## VIDEOS

*The promised land NMNC Films* 18/06/2017 Owino Sang'iewa Yoba for Life Foundation <https://www.youtube.com/watch?v=sj0OFtkUzec> -

*Yongera omutindo ku mata ofunemu (translated: Improve on the value of milk to get better premium)* <https://www.youtube.com/watch?v=fVFp39g5Um8>

**View all related project outputs in the IDRC Digital Library** <https://idl-bnc-idrc.dspacedirect.org/browse?type=project&value=108122>

## QUICK FACTS

Project location(s): Kenya, Tanzania, Uganda

Institutions: Western University (Canada); Jomo Kenyatta University of Agriculture and Technology (JKUAT) (Kenya); Heifer International (USA)

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