

Factsheet final findings Global Challenges Programme Call 1



Zambian traditional fermented foods

Summary

Fermented food products have significant added value compared to unfermented food products, such as: enhanced digestibility and associated higher nutritional value; enhanced food safety by protection from proliferation of pathogenic microbes; and a prolonged shelf life. Fermented products have been produced and consumed around the world for centuries. In many African countries, local fermented products exist, which offers a great potential to enhance nutritional status and livelihood of local people. In Zambia, commonly found traditional fermented foods include Mabisu, based on milk, and Munkoyo, based on cereal.

The variations that exist in processing practice of the two products were assessed as well as the microbiology of fermentation that is key to the processing of these foods. This allows to now standardize processing procedures and to sue defined mixtures of microbes to better control the fermentation process. Also, the perceptions of consumers and producers regarding food safety aspects of the products was evaluated, revealing that most consumers, both in urban and rural areas, prefer the traditional product over modern simplified versions of fermented foods. The results are a best practice on how to characterize traditional processing procedures aiming at improving the food production chains themselves and better address the demands of urban and rural consumers.

Final research findings

It was found that for both products, variations existed that give rise to regional variations of the product. The products are almost exclusively produced at the household level. For the fermentation, a first characterization of the present types of microbes has been made, and the nutritional content of the products has been quantified. The current diet of people in rural areas was additionally surveyed. It was found that especially Mabisu can contribute to optimizing the local diet since consumption of Mabisu adds essential micro-nutrients, B-vitamins and protein to diets. Food safety properties of the products were assessed by studying the ability of relevant pathogenic bacteria to grow and survive in the products during processing and in the final product, using protocols of the European Union. All bacteria tested are inhibited for growth and survival. The Standards Bureau in Zambia will formalize Mabisu processing protocols to allow sales at the formal market through formal market channels.

Achieved outcomes

The project has demonstrated that process optimization can be in reach of local processors and that local urban consumers are interested in the traditional rather than globalized versions of milk and cereal fermented foods. Nutritional information on the two fermented foods can be used to inform nutritional programs to include local foods. The project has further developed traditional fermented foods as a model system for fundamental research into eco-system stability.

Messages to

A) Actors from private sector:

Local cooperatives can develop into organizations that can be equal partners to larger companies.

B) Civil society and practitioners organizations:

NGOs working on local rural capacity building are instrumental to the success of improving traditionally fermented food chains by bringing together local farmers and producers.

C) Policy makers:

There is a need for legislation to allow specific products on the market. Currently, raw milk, needed for Mabisi production, and plant roots, used for Munkoyo production, are not allowed on the market. The results of this project can be used to initiate approval for sales through formal market channels.

Knowledge products

PhD theses

- [“Product optimization of Zambian traditionally fermented milk – mabisi”](#) By Himoonga Bernard Moonga (Wageningen UR and University of Zambia, October 2019)
- [“Nutrition, health and microbial ecology of traditional fermented foods in Zambia”](#) By Justin Chileshe (Wageningen UR and University of Zambia, October 2019)
- [“Microbial community dynamics in traditionally fermented milk”](#) By Anneloes E Groenenboom (Wageningen UR, 2019)
- [“Spontaneous fermentation of Munkoyo; a cereal-based beverage in Zambia”](#) By Sydney Phiri (Wageningen UR, October 2019)

Scientific articles

- List with [scientific articles](#).

Related project items

- [Focus group discussion in a rural village to discuss research questions with local producers of Mabisi and Munkoyo](#).(YouTube, July 2020)
- Report of the Symposium [“Traditional fermented foods to promote Food and Nutrition Security in Africa”](#) (Lusaka, August 27 & 28, 2019)
- [Sketch for a research & training facility, starter culture production, and market research](#) (Article on Project page, March 2017)
- [Field visit and workshop Zambia](#) (YouTube, November 2013)

Knowledge networks

Knowledge sharing with the Food & Business Knowledge Platform and AgriProFocus will mutually benefit this and other related projects. Five dissemination workshops were held in Zambia, aimed at local producers and institutional stakeholders, which were attended by in total over 600 people.

Co-creation

Local farmers expressed that they are looking into ways to standardize their processing and that welcome the support from researchers to do so. Specifically, they would like to know how variations in their processing affect final stability of the products in terms of food safety. In response, the research has shown that re-using a final product to initiate a new batch gives the best results. Further, farmers wanted to know if low quality milk could be used to produce a safe product. The research project included tests of what levels of bacterial contamination can be tolerated to obtain high quality Mabisi. Standards bureaus can use this result to develop guidelines for formal processing. The collaboration with the academic partners enabled performing experimental work at field sites and processing of samples in Zambia. It further yielded insight in academic practice in various contexts and has built long-term scientific relationships.

Future research and activities

Local farmer cooperatives have been formed in the last few years that have also started to process primary produce such as raw milk. The project's next steps are to optimize current processing practices to SME level. The project is now able to define starter cultures for the products and their different variations. Starter cultures are defined mixtures of bacteria to ensure more consistent product quality. Based on this past project, we have obtained funding to continue the work and to further expand. The follow-up project will have 12 PhD/postdoc projects aimed at research into upscaling of Mabisi processing and connection to consumers, optimization of nutritional composition and impact in diets of consumers and the interaction with soil quality and soil biology in relation to product properties. Further, a project will start aimed at assessing the opportunities for entrepreneurship of local female processors. Not only Mabisi in Zambia will be studied, but also parallel projects on Mahewu in Zimbabwe and Akpan in Benin. For this new project, partnerships were built based on the network of the past project and engaged new partners in Zimbabwe and Benin.

Consortium partners

- [Wageningen UR – Laboratory of Genetics \(NL\)](#)
- [Wageningen UR – Food Quality and Design \(NL\)](#)
- [Wageningen UR – Food Microbiology \(NL\)](#)
- [University of Zambia](#)
- [Tropical Diseases Centre \(Zambia\)](#)
- [Heifer International - Zambia office](#)
- [CSK Food Enrichment \(NL\)](#)
- [Yoba-for-Life Foundation \(NL\)](#)

Contact person

Sijmen Schoustra, Wageningen University/University of Zambia
Sijmen.schoustra@wur.nl

Project website

[F&BKP Research Project page](#)