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 as a means of preserving food and increasing the nutritional value of raw material. In many African countries, local fermented products exist with interesting properties, which offers a great potential to enhance nutritional status and livelihood of local people. In Zambia, commonly found traditional fermented foods include Mabisi, based on milk, and Munkoyo, based on cereal.

The project aimed to improve the food chains between consumption and production of these two Zambian traditional fermented products by aligning needs and preferences of rural and urban consumers with practices of local producers, mainly women in rural areas. We assessed the variations that exist in processing practice of the two products and the microbiology of fermentation that is key to the processing of these foods. We evaluated the perceptions of consumers and producers regarding food safety aspects of the products.

Needs and preferences of rural and urban consumers and production processes need to be aligned for a product to have impact in promoting food and nutrition security. Our project has provided scientific insight to allow to align these needs. Moreover, the nutritional and food safety aspects of products in relation to the currently used processing practices – including mixtures of microorganisms used for product fermentation – need to be optimized to expand production and processing. have not been determined and optimized. Our 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. Tailor-made starter mixtures for fermentation will also be formulated. As a next step in the dissemination phase of the project, SME level processing protocols to produce traditional foods for members of farmer cooperatives in Zambia are developed. The project work can serve as a model in how to promote production and consumption of traditional foods in Africa.

Final Research Findings

The research consortium started by characterizing the current variations in production processes among producers. It was found that for both products, variations exist that give rise to regional variations of the product. The products are almost exclusively produced at the household level. In fermentations, 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 Mabisi can contribute to optimizing the local diet. 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. We are 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. We assessed food safety properties of the products 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. We found that all bacteria tested are inhibited for growth and survival. We are now in contact with the Standards Bureau in Zambia to formalise Mabisi processing protocols to allow sales at the formal market through formal market channels.

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 who work 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, Mabisi is based on raw milk and Munkoyo is produced using plant roots and these are not allowed on the market. The results of our project can be used to initiate approval for sales through formal market channels.

Knowledge products

- Four PhD theses from this project have successfully been defended.
- This video gives an impression of a project focus group discussion in a rural village where the project team is discussing their research questions with local producers of Mabisi and Munkoyo.
- Here you can find a sketch for a research & training facility, starter culture production, and market research at the University of Zambia that the project team has composed based on their midterm findings.

Knowledge networks

Knowledge sharing with the Food & Business Knowledge Platform and AgriProFocus will mutually benefit this and other related projects. We further held three dissemination workshops in Zambia, aimed at local producers as well as institutional stakeholders, that were attended by over 400 people.

Co-creation

The research project originated from fundamental science and the study of fermentation with a focus on the ecology and evolution of microbes. In this research, there are more questions than this project group has time and resources for. The contribution of various local stakeholders and their organizations has greatly helped to prioritize the research by rooting it into the local context. By asking local rural producers about their practices, needs and queries regarding the products they produce, as well as engaging consumers by asking them about their preferences; this is a very rewarding way to narrow down what questions to ask. Stakeholder engagement is also key to generate logistical support for project activities.

Interestingly, the questions that are viewed as most pressing by rural communities are the same questions that are most exciting from a fundamental science perspective. These questions focus on what factors stabilize (microbial) eco-systems. For local practices, answering this question should point to best practices on how to get a safe, tasty and reproducible product and how to adjust product properties to the needs of consumers. From a fundamental science perspective, this will show what selection pressures stabilize a biological system over evolutionary time scales.

Future research and activities

Based on this past project, we have obtained funding to continue our work and to further expand. The follow-up project will have 10 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, we will have a project aimed at assessing the opportunities for entrepreneurship of local female processors. We will not only study Mabisi in Zambia, but will now also include parallel projects on Mahewu in Zimbabwe and Akpan in Benin. For this new project, we built partnerships based on the network on 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)

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Project website

F&BKP Research Project page