



STATUS REPORT ON THE SMALLFISHFOOD PROJECT

SUBMITTED BY THE

CSIR-FOOD RESEARCH INSTITUTE TEAM

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Small Fish and Food Security: Towards innovative integration of fish in African food systems to improve nutrition.

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Executive Summary

Even though small fish have been categorized as having been overfished and there have been declining stocks over the past years, the small fish industry in Ghana continues to provide food security, nutrition, employment, income and maintenance of livelihoods for fishermen and fish processors. Traditionally, the process of sun drying in Ghana and other parts of Africa involves drying the fish on the ground. This practice has led to concerns about the safety and quality of these small fish. Additionally, incomes are lost during the rainy season where the fish gets washed away with the run-off water.

This project therefore seeks to offer an alternative means of processing fish by sun drying with improved, cost effective, user friendly technologies, and the development of value added products. Generally, the objectives of the team are to construct improved fish drying platforms/fish rack for the 4 fishing communities in the Greater Accra, Central and Volta Regions of Ghana. Microbiological, chemical analysis, and trace metals analysis would be conducted on the fish before and after drying. The fish processors would be trained on good hygienic and manufacturing practices and on adding value to their sun-dried fish by salting, milling and packaging as well as inclusion of the improved sun-dried fish or fish powder in existing foods and development of new food products to enhance products' shelf, utilization and technology transfer.

In 2019, the CSIR-Food Research Institute team achieved most of their project objectives. Drying platforms and drying racks have been constructed in Tema New Town (TNT) and Moree for fish processors and on a pilot scale at the CSIR-Food Research Institute for drying trials. The hammer mills have also been fabricated for CSIR-Food Research Institute, TNT and Moree for use in adding value to the small fish. Sealing machines have been donated to the 2 communities to improve the packaging of their small fish. The fish processors have also been trained on preparation of some of the developed products and educated on other ways of improving their nutritional needs through the use of value added small fish. The report will capture further, details of the activities with pictures.

1.0 Project Overview

The LEAP-agri “SmallFishFood” project offers innovative thinking focusing on how utilization of small fish (often labelled as trashfish) can be transformed in a direction where fisheries governance, marketing mechanisms and health policies ensure that the value of these fish are recognized and utilized sustainably for human consumption and good health.

The project seeks to achieve this in 2 ways; through maximization and preservation of the nutritional value of small fish and through minimizing the environmental impacts and maintenance of the ecosystem structure and functioning. The project is in four main work packages however, the activities of the CSIR-Food Research Institute team is captured under work packages 2 and 3 respectively.

Our activities therefore are to identify and describe the harvesting, marketing and utilization patterns of small fish and how they contribute to food and nutritional security in Ghana, and improvement of the production processes to achieve better quality and longer shelf life.

In Ghana, small fish have been categorized as having been overfished and there have been declining stocks over the past years. However, the small fish industry in Ghana provides food security, nutrition, employment, income and maintenance of livelihoods for fishermen and fish processors.

1.1 Introduction

The traditional practice with sun dried fish all over Africa involves drying the fish on the ground. This practice has led to concerns about the safety and quality of these small fish. In Ghana, small fish are usually fried, smoked or sun-dried which is commonly done on the ground.

This project therefore seeks to offer a hygienic means of sun drying fish specifically Anchovies (*Engraulis encrasicolus*); Atlantic bumper (*Chloroscombrus chrysurus*) and African moonfish (*Selene dorsalis*) with improved, cost effective, user friendly technologies, and the development of value added products. This report therefore highlights activities of the CSIR-Food Research Institute Team for the year 2019.

2.0 Construction of a pilot scale drying platform and racks for drying small fish at the CSIR – Food Research Institute.

The prototype was fabricated to conduct drying trials with small fish to assess the efficacy of the platform and drying racks. The drying platform measures 4425 mm length, 1800 mm width and a height of 950 mm which sloped to 800 mm. Its columns are 450 mm in the ground and is generally constructed using cement blocks and concrete mixture with iron rods reinforcements at the corners and mid-section. It was painted with Coral damp proofing paint for protection against fungal attack and damping of the platform. The drying racks measures 2200 mm length x 700 mm width. The drying racks provided were also to allow for easy turning of the fish during drying. Initially the drying racks were only covered with wire mesh. But it was realized during the trials that it still attracted flies so was subsequently superimposed with mosquito nets. The design of the racks also allows for easy flip-over to dry the bottom side of the fish in the rack. It allows the drying fish to be locked or enclosed to prevent the falling of the fish onto the bare ground when the rack is being turned/flipped over. They are easy to use, prevents contamination of the fish by flies which serve as vectors of disease transmission. Another important essence of the drying rack is that it can easily be covered with polyethylene material during the rainy season or moved to a safe dry place whereas when the fish is dried on the ground, it gets washed away by the rains causing financial loss to the women fish processors.



Fig. 1 Construction of drying platform at CSIR-FRI



Fig 2. Completed drying platform and rack

Conducting drying trials with small fish to assess the efficacy of the platform at CSIR – FRI



Fig 3. Washing fish for drying



Fig 4. Spreading of fish on rack and sun drying of small fish in enclosed racks



Fig 5. De-heading and de-gutting of sun dried fish for product development

2.1 Installation of the hammer mill for milling dried fish samples at the Fish Laboratory of the Food Research Institute.

The hammer mill is made from stainless steel and has a 7.5HP three-phase electric motor. The hopper at the top receives the whole dried fish which is to be milled and is channeled through the small mid-section into the milling compartment. Over here, the blades break, crush, and mill the whole dried fish into powdered fish. This comes out through the extension at the bottom and is collected into cotton sacks initially. Due to the high rotational speed of the motor, the hammer mill

must be firmly placed in the ground at all times during operation. Trial runs, milling and packaging dried fish samples of anchovies and bumper fish for use with products to be developed.



Fig 6. Trials with the hammer mill

2.2 Product Development Activities

The products developed are instant cereal mix made of Anchovies and bumper, anchovies and bumper pepper sauce mixes, the bumper and anchovies pepper sauce, fish nuggets made from anchovies and bumper fish as well as waffle mixes made with anchovies and bumper fish. The de-headed and de-gutted fish in whole and milled were also packaged.

The pictures are shown below:



Fig 7. De-headed and de-gutted whole fish



Fig 8. De-headed and de-gutted milled fish powder



Fig 9. Bumper Pepper Sauce Mix



Fig 10. Bumper and Anchovies Pepper Sauce



Fig 11. Bumper and Anchovies Waffle Mix

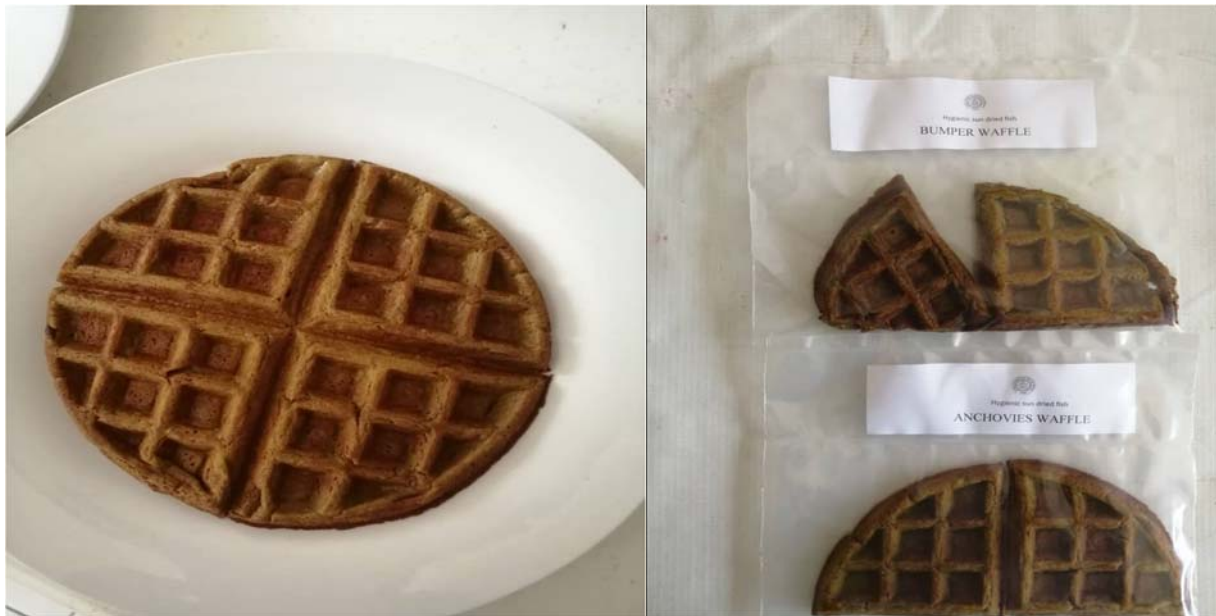


Fig 12. Waffles from Bumper and Anchovies



Fig 13. Bumper and Anchovies nuggets



Fig 14. Samples of the instant cereal developed

2.3 Construction of the drying platform at Tema New Town (TNT).

The construction at TNT was fraught with challenges. Tema Metropolitan Assembly (TMA) was asked to provide land for the construction following which there was a stakeholder engagement with the TMA and the National Fish Processors and Traders Association (NAFPPTA) for the allocation of piece of land for the siting of the platform and hammer mill. Unfortunately, after the foundation of the platform was laid, land litigation issues led to a halting of the construction. After several discussions with the TMA, the Assembly allocated another parcel of land for the construction of the platform and footed the bill of the litigated one. Even though the SmallFishFood team was not happy about the selected site as it was far away from the current grounds being used by majority of the women for drying, it was not changed and so we had no choice than to go ahead with the construction.



Fig 15. Land allocation for the construction of platform



Fig 16. Construction of concrete drying platform at Tema New Town

3.0 Visit by Consortium Partners

Consortium partners (Marian Kjellevoid, Ragnhild Overå, Paul van Zwieten, Jeppe Kolding and Randi, Jeppe's Masters student) from Norway and Netherlands visited the team from 30/09/2019 to 04/10/2019 at FRI to assess the progress of project implementation. They were welcomed to the Institute by the Deputy Director, Prof. Charles Tortoe. This visit was useful as the partners and the FRI SmallFishFood team met with the Tema Metropolitan Assembly headed by the Chief Executive, Mr. Felix Annang-La, Head of the Local Economic Development Unit of the T.M.A, Mr. George Dzeto, and other officials to discuss issues with respect to challenges associated with the siting of the drying platform. Mr. Felix Annang-La and Mr. George Dzeto assured the team of their support for the project and hope for other collaborations in future. This was immediately followed by a visit to the construction site. It was suggested by partners that considering the cost involved in construction of the drying platforms, the increasingly cost of the concrete platform and the few capacity (10 drying racks), cheaper materials like wood or bamboo be used in the construction of the platforms instead to make the platforms more affordable and increase capacity so that the women processors can replicate the technology.

Other places visited included the Tema fish landing and processing (drying and smoking) sites where they interacted with the Chief fisherman and his elders. Adabraka and Maamobi Tuesday markets was also visited to interview some fish traders and processors. A fish processor and her household at Nyanyanor were interviewed and the Nyanyanor fish landing site were also visited. A presentation by Jeppe Kolding on the project was made to the students and staff at the department of Marine and Fisheries Sciences, University of Ghana among others were carried out during the visit.



Fig 17. Visit of some Consortium Partners to FRI

4.0 Stakeholder engagement with Tema Metropolitan Assembly

FRI SmallFishFood team was invited to make a presentation on its project objectives and activities at a forum organized for stakeholders including GIZ of German Development Co-operation, Ghana Export Promotion Authority (GEPA), Small Scale Industries, different market women associations etc by the Tema Metropolitan Assembly. The presentation was done on behalf of the team by Margaret Owusu which attracted a lot of interest.



Fig 18. Stakeholder engagement at Tema Metropolitan Assembly

5.0 Activities at Moree (Central Region)

Stakeholder meeting at Moree – Central Region

The CSIR-Food Research Institute team also visited the Moree landing site for discussions with stakeholders on the construction of the platform and the location of the platform at a site convenient and suitable for the fish processors.



Fig 19. Discussions on site allocation and initial allocated site

At Moree there were few challenges with location for siting the drying platform. Although the initial engagement with the Chief and elders had indicated it would be sited close to the landing site, it was finally changed and constructed at a site within the Moree township. At Moree, a simpler design of drying platform was constructed for the community. The design of the drying platform was made simple and affordable through the use of a mixture of wood and concrete so that these processors can replicate them on their own. The affordable alternative drying platform has a high quality wooden (dahoma timber) drying frame treated with desban to prevent insects infestations on which the racks are placed, supported on embedded concrete support stands.



Fig 20. Construction of platform and drying racks at Moree

6.0 Training and Technology Transfer

Other activities within the last quarter of 2019 focused on transfer of technology. It entailed training of women at Moree and Tema New Town to be able to wash in salt solution and process fresh fish hygienically, dry, de-head, de-gut and package to come up with a more hygienic product which will be of better quality for consumers. These can be packaged and sold even in big supermarkets and malls to enhance their livelihoods and income. They were therefore tasked to take advantage of these opportunities. They were also taken through how to prepare the various products developed and emphasis was laid on the benefits of supplementing other foods like weaning foods with small fish powder. Handing over of hammer mills and sealing machines were carried out. Since the budgeted amount for the hammer mill had increased drastically and sealing machines were not budgeted for but are needed by the communities, CSIR-FRI management agreed to support the project with the purchase of five (5) sealing machines and three (3) additional hammer mills after an appeal was made to them by the team. The small fish food project is grateful to FRI management. All participants were provided with lunch packs after the training.



Fig 21. Moree fish processors washing anchovies prior to drying on racks



Fig 22. Drying on racks and handing over drying racks at Moree



Fig 23. Training women in Moree on how to make the different products developed



Fig 24. Handing over hammer mill and sealing machine to processors at Moree

With the Tema New Town processors, although the technology transfer and handing over of equipment had been slated for December, 2019, the women processors were not ready to meet with the CSIR Small fish team hence, the training and technology transfer was held in January, 2020. TMA played a key role in making the programme a succes for which the team is very grateful. Below are pictures from Tema New Town training and handing over.



Fig 25. Hygienic washing of bumper prior to drying at Tema New Town (TNT)



Fig 26. Drying on racks at TNT and handing over of racks and drying platform



Fig 27. Training on product developments at TNT



Fig 28. Samples of fish products developed by the processors TNT



Fig 29. Handing over sealing machine and hammer mill at TNT

7.0 Way Forward

The CSIR-FRI Small Fish team will be looking forward to constructing two more platforms during the project duration to other fishing communities. There are plans to replace James Town with Prampram following their uncertainty to provide land as a result of the proposed construction of a landing beach on the available land by Government.

8.0 Conclusion

Overall, the Consortium partners were very impressed with progress made by the CSIR-FRI team in implementing the objectives of the project. The fish processors were also very delighted to see how value can be added to sun-dried fish and were excited at the endless possibilities of generating additional income. The fish processors expressed interest in constructing their own drying platforms and racks and the Tema Metropolitan Assembly also indicated that they had sought for funding to construct additional platforms and hammer mills for the Tema New Town landing site.