UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY (UNCST)

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POLICY BRIEF:

Piloting the Production and Distribution of a Low Cost 'Protein and Micro-Nutrient Rich Cricket Feed from Food Waste in Kampala

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Executive Summary

Sub-Saharan Africa (SSA) is facing hunger and malnutrition challenges combined with a high and the fastest (2.6 %) growing population in the world, a third of which is young, that is, below 24 years of age (UNFPA & PRB, 2012; Plecher, 2019; World Population Review, 2020). Simultaneously there is high annual per capita food loss/waste of 120 -170 kg (Sheahan & Barrett, 2017). Hence, food waste is anticipated to increase with the increasing population and corresponding malnutrition challenges. Using the increasing food waste as a raw material (feed) for production of animal protein can exploit the generated food waste while addressing the malnutrition challenges especially the demand for quality protein.

The proto-type cricket feed is nutritious with a performance similar to that of the control diet. It contains a minimum of 21% protein content, 8% fat, 3% fibre, 6% ash, and 380 Kilo calories of energy.

Introduction

The sub-Saharan Africa (SSA) subcontinent is currently facing three major and growing challenges related to food. These include (i) a high and the fastest (2.6 %) growing population in the world, a third of which is young, i.e., below 24 years of age (Plecher, 2019; UNFPA & PRB, 2012; Word Population Review, 2020) which translates into an increased demand for nutritious food; (ii) high levels of malnutrition, especially under nutrition among its largest population, i.e., infants and children (UNICEF/ WHO/WORLD BANK, 2017) and vulnerable groups such as pregnant and breast-feeding mothers (Duffin, 2018; Fanzo, 2012) partly resulting from a low per capita consumption of high quality animal protein and micro-nutrient rich foods (estimated at 13.4 and 33.9 kg for meat and milk respectively compared to the world's estimated at 45.3 and 89.5 kg by 2030) (WHO, 2020); and (iii), high annual per capita food loss/waste of 120 -170 kg (Sheahan & Barrett, 2017) that ends up at landfills, posing an environmental and health burden to the surrounding population (EJAtlas, 2015; Sarpong et al., 2019). This implies that food waste, an important resource laden with unutilized nutrients is disposed of at landfills amidst the increasing demand for the same nutrients.

Methodology

Given that food wastes are heterogeneous in terms of moisture content, nutrient composition, particle size and consistency, a technology had to be developed, to create hygienic solid food material materials that could be dried and milled to flour for compound feed mixing. After compounding, the feed was tested at both laboratory and farmer level for its ability to contribute to cricket growth and performance, and the successful recipes made available for sale to interested farmers. This way, an affordable nutritious, safe, and shelf stable low cost cricket feed was availed to the cricket farmers. Food waste is so far available in sufficient amounts that can be transformed into a low cost feed to support increased animal (cricket) protein production and supply. However, for this to be realized, there is need for (i) an efficient sorted food waste collection and supply system, and (ii) transfer of the developed technology to the private sector for commercialization to enable

continued cricket feed supply beyond the laboratory research stage.

Research Results

- On average, with a solid waste collection coverage of 45%, households, institutions and markets in Kampala can respectively supply 768 metric tons of food waste per day.
- Over 90 % of the respondents recognized food waste as a problem, and as a resource especially for use in livestock feed production, and were willing to consume insects raised on feed from food waste.
- The developed processing protocol is able to successfully convert food waste into highly palatable, safe and shelf stable cricket feeds
- The feeds are nutritious with a minimum of 21 % protein, 8 % fat, 3 % fibre, 6 % ash, and 380 Kilo calories of energy.
- The four developed feeds supported cricket growth to various extents with recipes 1 and 2 performing better and similar to the control diet
- The crickets raised on feeds developed from food waste are nutritious with 49 – 61% protein, 14 – 20% fat, 3 – 5% ash, and 20 – 30% fibre.
- The crickets are safe, free from aflatoxins, heavy metals, pesticide residues and microbial pathogens such as salmonella
- The return on investment upon using the cricket feed in a cricket rearing operation are high, i.e., 50.1% compared to 11 % when using farmer formulated feeds.

Conclusion

Food waste is a valuable resource whose valorization should be promoted. There is potentially enough supply of enough raw material (food waste) for processing into cricket feed to satisfy the current demand and the waste value chain has the ability to create descent employment for persons involved in the collection, processing, distribution and marketing of feed processed from food waste. Feed from food waste can result into palatable, nutritious and safe quality crickets thus making the cricket rearing venture more profitable.

Policy Implications/Recommendations – call to action

- Develop a policy to encourage and incentivize solid (food) waste valorization
- Fund the commercialization of research findings to enhance animal protein production from waste while reducing the negative effects of solid waste to the environment
- Stakeholders involved in solid waste management should develop and encourage sorted solid waste collection measures to aid adequate solid waste separation and subsequent valorization
- Encouraged and promote Insect production for food and feed as a way of contributing to sustainable solid waste management
- Private-Public-Partnerships in research and development programs be encouraged and supported to solve real life challenges.

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