Progress in Developing and Utilizing OFSP purée

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SWEETPOTATO ACTION FOR SECURITY AND HEALTH IN AFRICA

SASHA 2 OBJECTIVES & GOALS

SASHA
Sweetpotato Action for Security and Health in Africa

To develop appropriate production and storage methods for quality sweetpotato puree and ensure that products made from stored puree are safe and nutritious

- **The goal is to be able to store quality puree for four to six months without a cold chain and to ensure that the products made from stored puree are not markedly different to those from fresh puree.**

OFSP Puree

- Steam and mashed product.
- 1.5kg of fresh OFSP = 1kg puree
- 5-7kg fresh OFSP -1kg OFSP flour
- Makes nutritious products
- Makes highly acceptable products

Commercialization of OFSP puree

- In Kenya we have SMEs processing OFSP puree and using the cold chain to supply larger retail bakeries in Nairobi
- The cold chain is expensive and inefficient
- There is need to develop a shelf-stable OFSP puree to increase uptake

Ensuring Safe and Nutritious OFSP puree

Hindawi
International Journal of Food Science
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Research Article

Good Manufacturing Practices and Microbial Contamination Sources in Orange Fleshed Sweet Potato Puree Processing Plant in Kenya

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Ensuring Safe and Nutritious OFSP puree

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Food Safety Knowledge, Attitude and Practices of Orange Fleshed Sweetpotato Puree Handlers in Kenya

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Developing Shelf-Stable OFSP puree

OFSP puree processing and packing

Chemical preservatives **Potassium sorbate, sodium benzoate and citric acid** Together with **vacuum Packing** preserves OFSP puree shelf-life By 3 months at Ambient conditions

Shelf-stable Puree is safe

Hindawi
International Journal of Food Science
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Research Article

Effects of Acidification and Preservatives on Microbial Growth during Storage of Orange Fleshed Sweet Potato Puree

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Product Development with Shelf-stable OFSP puree

With some modifications to the recipe, shelf-stable OFSP puree made bread with similar physiochemical properties, sensorial and organoleptic properties as fresh puree

Two manuscripts submitted to Journals of Food Science and Open Agriculture

Physiochemical properties properties of fresh puree and shelf-stable puree bread

Table 4: Results for Proximate Composition of the OFSP Puree Composite Breads Compared to Standard White Bread (g kg^{-1} dry weight)

Chemical composition	White bread	30% Fresh puree bread	30% T1 SS bread	30% T2 SS bread	40% Fresh puree bread	40% T1 SS bread	40% T2 SS bread
Moisture	278.7±4.8^{a}	301.4±16.9^{b}	298.6±29.1^{b}	296.3±10.7^{b}	326.2±19.5^{b}	319.2±16.6^{b}	313.8±28.9^{b}
Crude ash	15.9±4.9^{a}	17.2±2.6^{ab}	20.7±1.3^{bc}	21.6±3.7^{bc}	17.6±2.4^{ab}	22.4±2.6^{c}	21.8±2.4^{bc}
Crude fat	61.6±1.05^{a}	57.6±1.8^{a}	58.7±4.2^{a}	52.1±10.7^{a}	59.1±5.0^{a}	46.9±9.0^{a}	65.2±18.1^{a}
Crude protein	11.00±8.1^{a}	110.7±5.1^{a}	109.6±5.8^{a}	108.7±2.8^{a}	109.9±1.5^{a}	111.2±9.3^{a}	104.8±2.2^{a}
Crude fiber	12.3±2.6^{a}	18.3±8.1^{a}	13.9±1.7^{a}	14.6±3.6^{a}	19.5±7.6^{a}	14.9±2.1^{a}	22.4±9.3^{a}
Carbohydrates	794.1±11.3^{a}	788.9±13.2^{a}	788.4±8.8^{a}	793.9±18.4^{a}	785.3±4.2^{a}	794.1±11.4^{a}	775.8±7.3^{a}

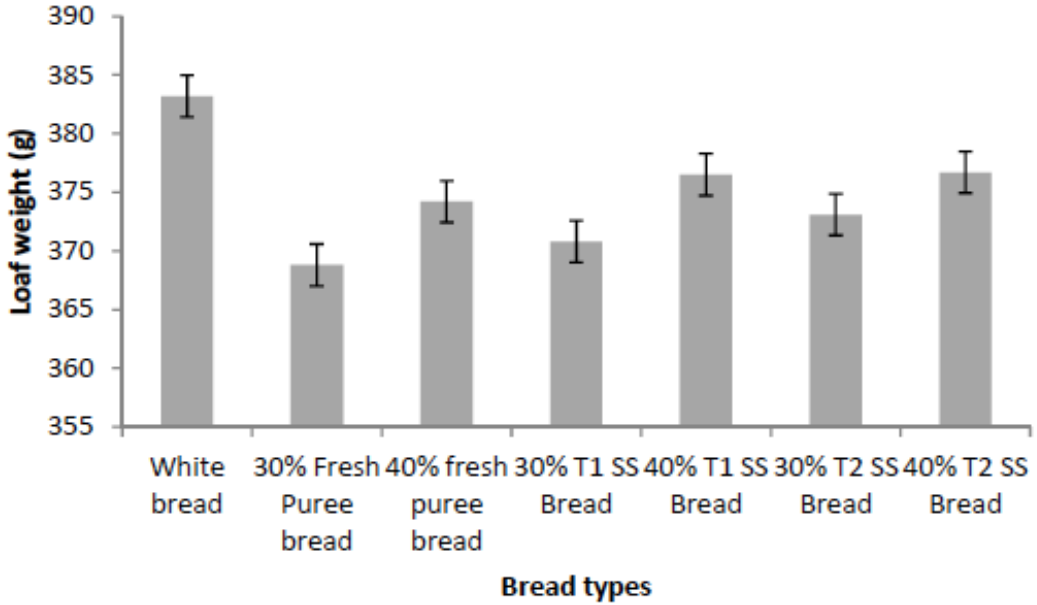
Values with the same superscript along a row are not significantly different at $P< 0.05$. *Values expressed in dry weight apart from moisture content, SS (Shelf Storable), SS-shelf-storable, T1 had 0.5% potassium sorbate+0.5% sodium benzoate+1% citric acid and T2 had 0.2% potassium sorbate+0.2% sodium benzoate+1% citric acid.

Physiochemical properties properties of fresh puree and shelf-stable puree bread

Figure 4: Specific Loaf Volume of bread g/cm^3

*SS-shelf-storable, T1 had 0.5% potassium sorbate+0.5% sodium benzoate+1% citric acid and

T2 had 0.2% potassium sorbate+0.2% sodium benzoate+1% citric acid



Applications for preservative treated Shelf-stable OFSP puree

Preservative treated Shelf-stable puree Slows yeast activity In doughs, hence Its good for baked And fried products Where yeast is not important and For smaller bakeries

Preservative free OFSP puree

Why?

- Clean label is premium now for food industry
- Increased shelf-life 12-36 months with no refrigeration
- Direct consumption of the OFSP puree as a food
- Diversified use of OFSP puree as a food ingredient for food industry and culinary application

Preservative free OFSP puree

CREDIT: SINNOVATEK LLC, Raleigh, NC, USA

How to achieve preservative free OFSP puree

Hotfill packing

- Hot filling is the process of sterilizing the product and inside of a bottle or container and cap or closure in order to ensure the safety of the product and prolong its shelf life (6-12 months)
- It is typically used for bottles containing <4.5pH products such as:
  - **Juices**
  - **Nectars**
  - **Purees and Soups**
  - **Vegetable drinks**
  - **Marinades**

How to achieve preservative free OFSP puree

Aseptic processing

- Aseptic processing is the process by which a sterile (aseptic) product (typically food) is packaged in a sterile container in a way that maintains sterility and increase shelf-life (12-36 months) with no refrigeration.

Aseptic OFSP puree processing for Africa and LIMC

Proposal: 18-3902

Nomatic™ CV-12A Small Scale Production Processor

Affordable, portable aseptic And hot OFSP puree Processing 2 tons per day Capacity.

- Trials planned for SSA in 2019
- Market assessment for the
- Technology underway in 2018

Business opportunities:
Partnering with industry leaders in Africa

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?

OFSP Bread

Vit A Low GI

Sasko Bakery, South Africa

- 1 million loaves daily
- Healthy bread choices

Business opportunities:
Affordable, nutritious, safe baby food

A high-hanging fruit?

- Mass demand
- OFSP puree based
- Food safety
- Packaging (50g sachets)
- Making it accessible for the poor

Business opportunities:
Puree for culinary applications

- Restaurants
- Institutional kitchens
- Contract food manufacturers

Dalberg study of OFSP investment and commercialization opportunities in Kenya, Malawi and South Africa

Dalberg

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SUBSISTENCE

- Produced **predominantly for on-farm consumption**
- **Where traded, mostly done through local informal** markets at rural levels

COMMERCIALIZATION

- **Produced in small part for formal commercial activity** – either for local markets or exports
- Formally processed for traditional foods, or **used for small scale baking and confectionary**

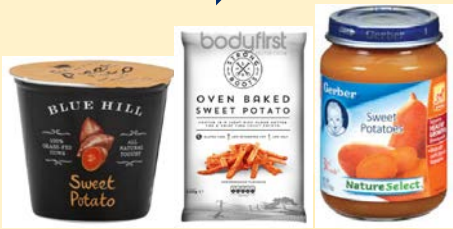
INDUSTRIALIZATION

- Produced in **large part for formal markets, processing and/or exports**
- Transformed **for wide range of applications** (beyond baking). **Used both visibly and invisibly**

Malawi

Kenya

South Africa



Source: Google images; Hellen Keller International; Dalberg analysis

Per country, three-step approach with a focus on *demand*, *processor perceptions* and *competitiveness*

Dalberg

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1 Assessment of demand and opportunity for OFSP processing

- What is the size of various markets where OFSP could be an input?
- How attractive would be OFSP-based bread, vis-à-vis other options available to commercial actors and consumers?
- **What do processors state as barriers to uptake for OFSP today?**

2 Success factors for realizing identified opportunities

- **If there is a business case for processing OFSP**, what would be required to realize that business case?
- If there is no business case, what elements would need to be addressed to kickstart an eventual case / opportunity?

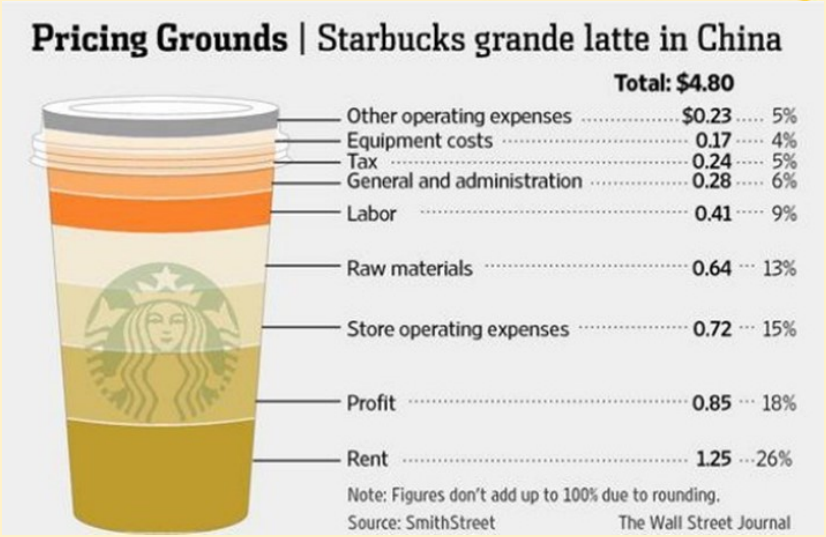
3 Synthesis and recommendations

- For identified commercial scale investment opportunities, **what investment size would be needed?**
- What additional considerations should be made?

Based on analyses across countries at the start of the study, we focused on including **OFSP in bread, chips, crisps, baby food** and **consumed fresh**

Next steps for OFSP puree in Africa

- Technologies
  - Storage options (roots, puree)
  - Varieties best suited for puree
- Supply chain management
  - Quality control
  - Intensification
  - Social inclusiveness in long run
- Scalability
  - New commercial partnerships
- Policy and standards
  - Developing standards for biofortified varieties and products



THE END

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CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas