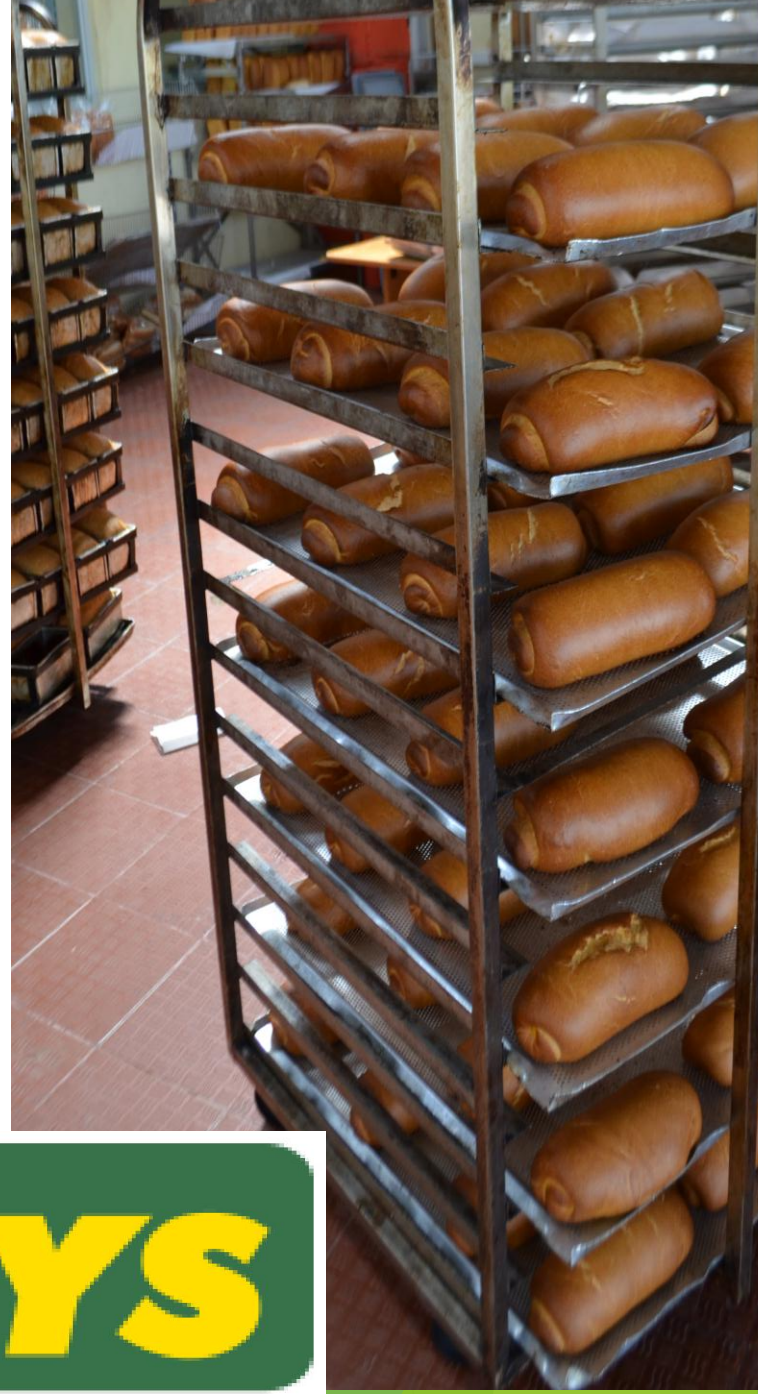
Use of orange fleshed sweet potato to produce commercially viable bakery items



Market, processing and utilization and Utilization community of Practice meeting

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Introduction

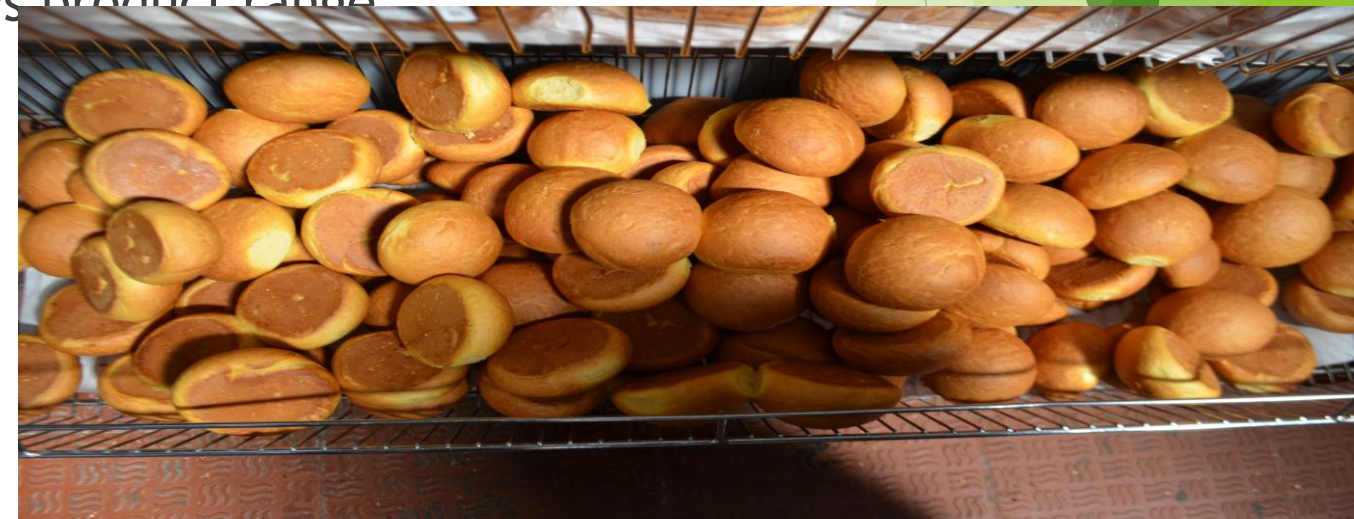
Tuskys is one of the largest retail chains operating over 40 branches in Kenya Since its establishment, the retail chain has been at the fore front in promoting healthy living.

The introduction of the OFSP to Tuskys by Euro ingredients Limited and CIP, came a time when the development of healthy bakery products line had commenced. The project was fully supported and the development of the products begun on the following items; bread, French gallets, Buns, scones, cookies, Muffins, and Cup cakes.

The project has been commercially viable and is rated number in the specialty bread category in terms of sales performance

Objectives of using the OFSP in Tuskys bakery product range

- Increase the healthy product range by increasing the bio-availability of Vitamin A in the products.
- Create a ready market for sweet potato farmers in the rural areas.
- Work with CIP to improve the socio-economic status of the farmers.
- Value addition of OFSP.
- Increase the existing uniqueness in Tuskys product range
- Generate revenue for the company



Product development

Test methods

- All the yeast raised products were tested by *straight-dough method*
- The muffins cup cakes and cookies were tested by *creaming method*

Substitution levels

OFSP puree replaced wheat flour in the following percentages;

- **30% to 50% in bread (40% optimal)**
- **35% to 50% in gallet (French bread) (40%)**
- **40% to 55% in buns and scones (45%)**
- **50% to 60 % in cookies (55%)**
- **20% to 40% in muffins (25%)**

Product formulation

Ingredients	Proportions
Wheat flour	60%
Puree	40%
Sugar	1%
Salt	1.50%
Yeast	1.20%
Vital gluten	2% (puree weight)
Dough Improvers	0.50%
Shortening Fat	4%

Dough mixing quality & Dough rheology

The dough rheological properties was studied to estimate the potential of the composite dough in producing products which are acceptable.

Rheological parameters

- Dough development time (very short development time)
- Peak stability (very short and chilled water is required to retard yeast activity)
- Weakening time (depended on water added and dough temperature)
- Water absorption 35% (less water absorption due to puree moisture)
- Dough extensibility and elasticity

Proofing tests

The dough was tested at an optimal condition of 40 0C temperature and 85% relative humidity for 45 minutes. The parameters checked included,

- **Proofing time (short proofing time because the dough cannot withstand long fermentation time)**
- **Strength of the dough during proofing.**

Baking quality

The baking conditions varied with the products, however, for the yeast products, the following parameters were checked

Bread, gallets, scones and Buns **-**

- *Oven spring (very minimal and depends on proofing apart from buns)*
- *Product browning (browning* is rapid due to high sugar content)
- Baking time – Requires 5 extra minutes due to high moisture content
- Baking temperature- requires two stage temperature settings for bread, (230 0C for 7 minutes during crust formation and 200 oC for the rest of the baking time)
- Immediate depaning and cooling

Muffins and cookies (long baking time of upto 50 minutes) but at lower temperatures due to high moisture and poor aeration

Baking temperature and time

Item	Baking time (minutes)	Baking temperature (degrees centigrade)
bread	30	200
Buns	20	220
Gallets	25	190
scones	30	190
Muffins	50	180
Cookies	45	170

Product analysis

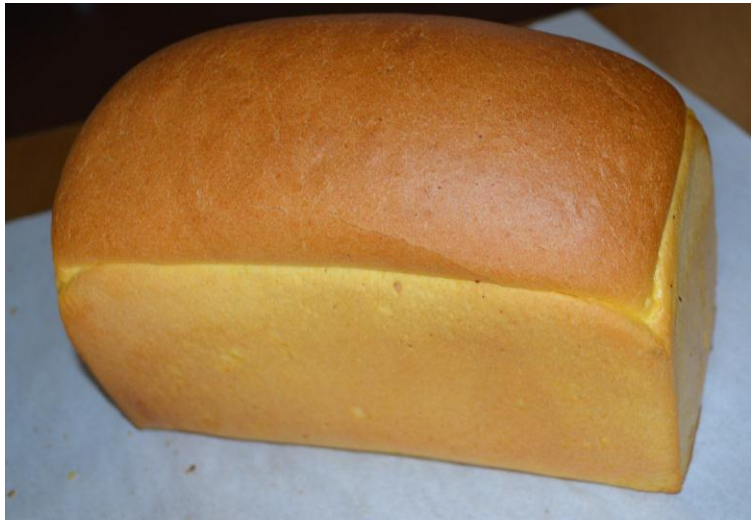
Bread and gallets were analyzed

External characteristics

- Bread volume
- Crust colour
- Crust character
- Symmetry of form

Internal characteristics

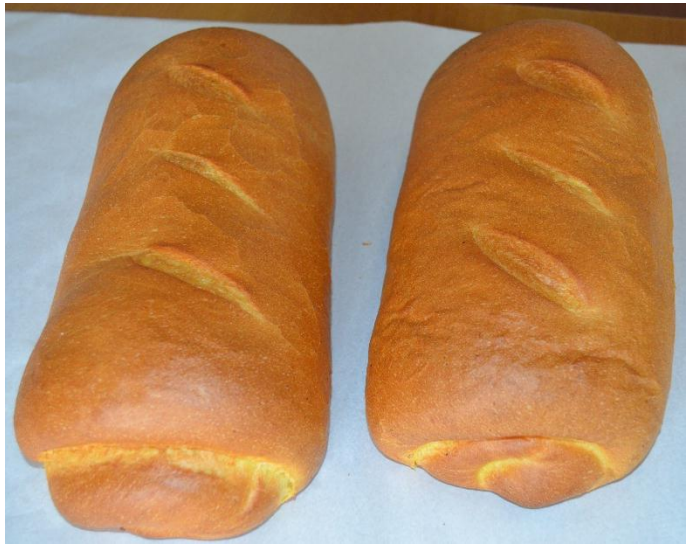
- Aroma
- Crumb structure
- Texture
- Crumb colour

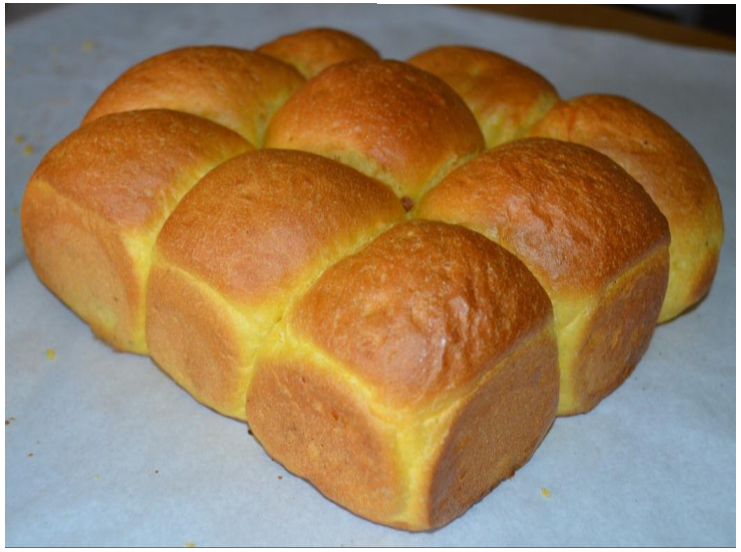


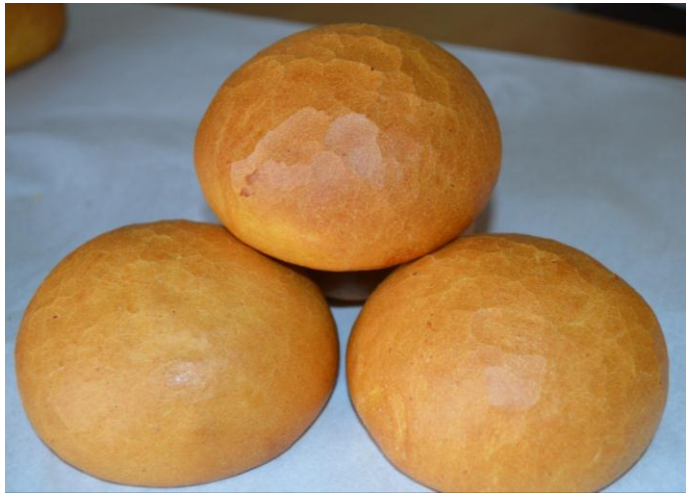
OFSP bread at 40% substitution

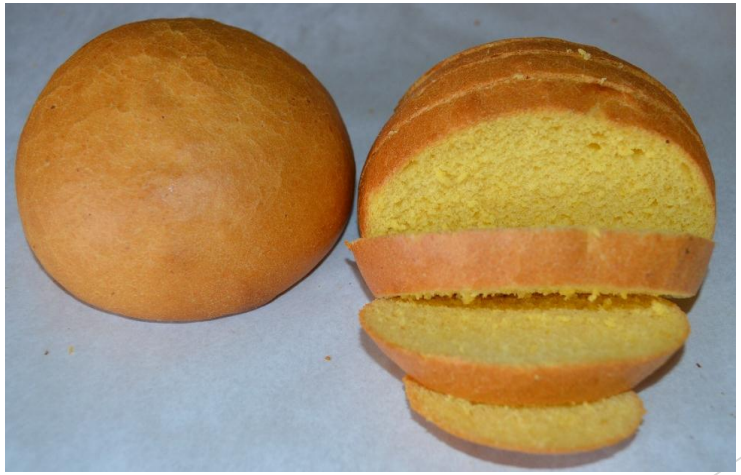
Gallet bread Crumb at 40% substitution

Other products







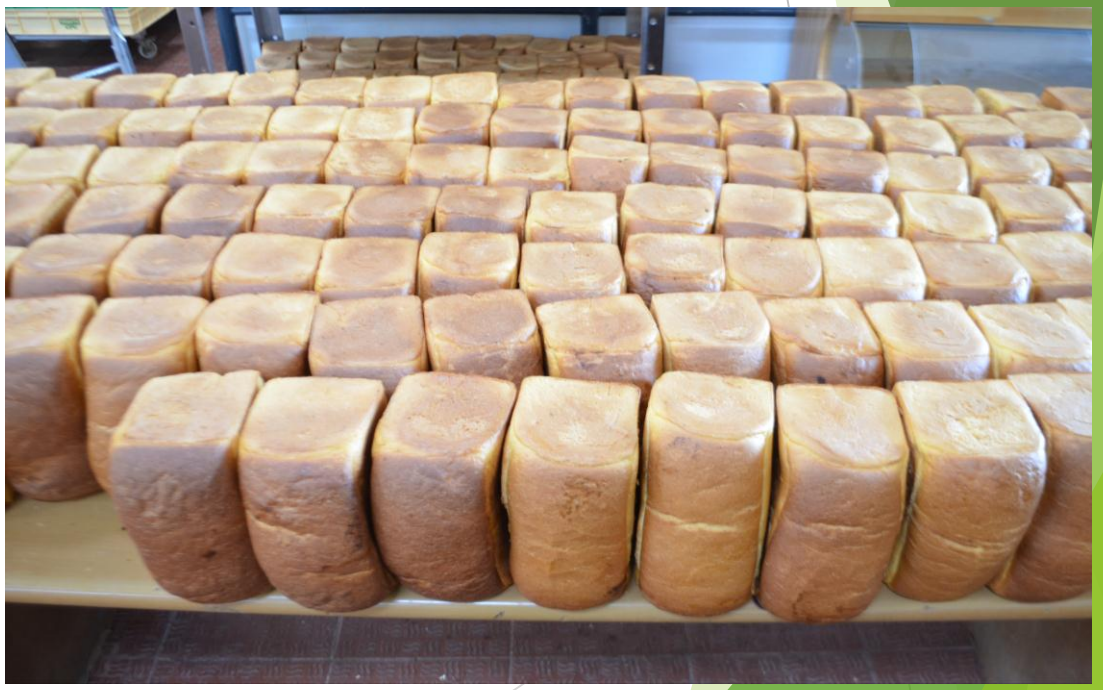


sensory evaluation results

The test results indicated that at levels not exceeding 30% substitution the bread making process was not affected. However the sensory evaluation conducted on a 9-point hedonic scale indicated that that the levels below 30% was low in OFSP colour and aroma. The panelists liked the products with over 40% OFSP in bread and gallets and 45% in buns.

To achieve this the following must be done

- To enable the wheat flour tolerate the 40% level,
- Functional gluten is used to strengthen the dough,
- The yeast activity must be retarded
- Dough conditioners and strenghtheners are required



Puree usage and production

- It is the intention of Tuskys to roll out the OFSP products in all its 40 plus branches in order to increases the uptake which is almost at 450Kg per day.
- This is spread in Nairobi (250kg) and <150 in Western

Table2: Daily production of OFSP products

Region	Bread	Buns	Gallet	Scones
Nairobi	720	360	288	360
Kakamega	120			
Kisumu	150			

Roll out plan

OFSP products will be launched in the following regions,

Nakuru,

Has three stores all with bakeries. One of the stores has space which can accommodate construction of a freezer.

Thika,

The town has three stores and OFSP product trials registered a great response and is to be relaunched immediately

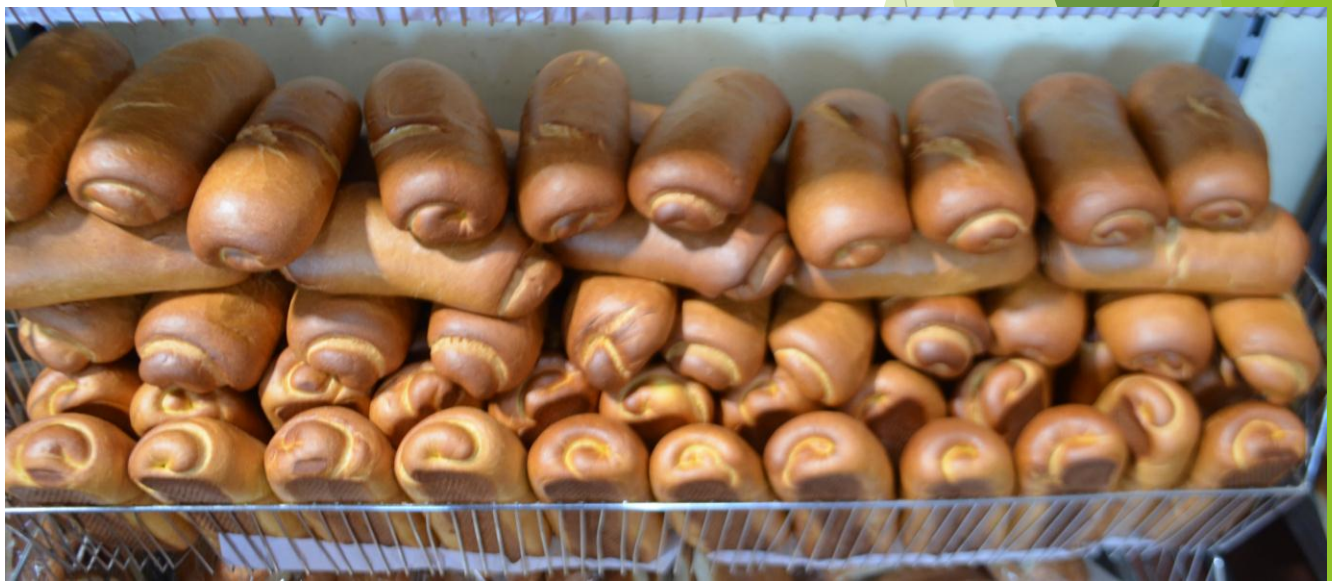
Western regions

The products were introduced in Kisumu and kakamega branches but had some logistical challenges, they have been re-introduced but still the usage is very low despite the great potential.

Consumer acceptance, concerns and suggestions

The customer response has been great and is expected to increase through customer awareness campaign. However the following concerns were raised

- Sugar levels
- Addition of food grade colours
- Development of OFSP with whole meal flour
- Availability in the stores country wide



Monthly OFSP products performance

ITEM	OCTOBER	NOVEMBER	DECEMBER
TUSKYS SWEET POTATO BREAD	1,601,650.00	456,950.00	1,944,600.00
TUSKYS SWEET POTATO SCONES	722,320.00	541,360.00	911,925.00
TUSKYS SWEET POTATO BUNS	799,815.00	842,065.00	1,226,820.00
TUSKYS SWEET POTATO GALLET	174,405.00	419,130.00	139,865.00
TOTAL	**3,298,190.00**	**2,259,505.00**	**4,223,210.00**

OFSP to be introduced and pending work

- Sweet potato cup cakes
- Sweet potato pound cakes
- Sweet potato muffins
- Sweet potato BBQ buns
- Sweet potato coconut bun with doughnut dough
- Sale of the roots in the shelves

Time lines

- Pound cakes – April
- Sweet potato BBQ buns –April
- Sweet potato coconut bun with doughnut dough- April
- Sweet potato muffins and cup cakes- June 2016
- Sale of roots – To arrange with CIP

Conclusion and Recommendations

- The use of the OFSP is very successful with yeast raised products at levels not exceeding 45%
- Products which are raised by baking powder retains more moisture and should be made using the dry flour instead of puree.

Acknowledgement

- CIP Team (Jan Low, Tawanda Mughingi, Peninah Muoki)
- EIL (Antonio Maghnaghi - Director)
- Tuskys (Mr. Steven Mukhuha Director)
- Organi Limited Team

THANK YOU