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Commercialization opportunities for the Orange-Flesh Sweet Potato (OFSP) in three countries: Kenya, Malawi and South Africa

Presentation of key findings

June 2018



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Contents

Context, approach and key findings

Country deep-dives

OFSP can have positive impact on farmer incomes, public health and food industry players



Benefits for farmer livelihoods

- **High yield potential** in comparatively **shorter growing seasons**
- **Tolerant to drought** and impoverished soils
- **Higher possible income per hectare** for farmers, if markets accessible



Benefits for consumer health

- **Higher nutritional value** (richer in pro-vitamin A, vitamin C and minerals) than many substitute crops (potatoes and other grains)
- **Lower carbohydrate and glycemic content**, making it suitable for health-conscious consumers
- **Increased food safety** as with recent technology more nutritious elements can be preserved



Benefits for food industry

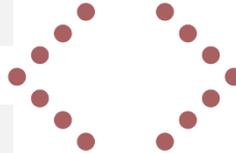
- In puree form **can offer economically viable and price-stable replacement to wheat flour** for baked products (bread, cookies)
- Given slowly increasing popularity with high-income consumers (previously a poor man's crop) and in western markets, **can offer high-value, premium consumer base for additional off-take**

Focus for today is on *investment facilitation* which may require you to think a bit differently

- Uptake and growth of OFSP has been impressive – quite unlike any other crop
- Natural next step is to look at large-scale commercial plays as ‘flywheel’ to spur growth
- USAID’s ISP programme focuses on *investment facilitation*. Nature of investment calls for opportunities for larger SMEs and up – notwithstanding the potential of innovation and viability at smaller scale
- To find opportunities, the ISP team focused on (1) demand, (2) a viable business case for processors and (3) a viable business case for farmers
- We invite you to put on the hat of an *investor* who is expecting a *return on investment* with *acceptable risk* – help yourself and **be tough**. Do the ‘savings’ litmus test
- Because we couldn’t only be tough, we have also identified opportunities that are less commercially viable knowing they may align only to the objectives of ‘impact driven’ anchor buyers

Paths presented in this presentation will vary in scale and attractiveness with a distinction between '*business opportunities*' and '*commercial scale investments*'

	Business opportunity	Commercial scale investment
Definition	<ul style="list-style-type: none">• Reflects an opportunity to access a market and operate profitably (i.e., could a business be run?)• Does not consider<ul style="list-style-type: none">• Size of the opportunity• whether it would be large enough to attract a commercial investor / operator	<p>Reflects an opportunity that</p> <ul style="list-style-type: none">• Operates profitably and• Can generate large enough free cash flows to cover the cost of getting involved (i.e., is it worth investing?)
Illustrations	Identification of a nascent, niche or locally significant markets that can only access a small number of customers generating, for example, a few hundred thousand dollars of revenue	A business operating in / a product for a large mass-market that can generate significant revenues (i.e., millions of dollars) that can justify investor / operator involvement



OFSP can be transformed into various products for human consumption, for animal feed and for energy production

Uses for OFSP	Sample end-products	Global dynamics around OFSP end-products
Fresh culinary use	Roots in raw, boiled, baked, steamed form	<ul style="list-style-type: none"> Main 'competition' is from grain and root substitutes
Processed Recognizable as sweetpotato Invisibly processed	Potato puree, baby food, crisps, juice, some baked goods, some jam Yoghurt, some baked goods, some jam	<ul style="list-style-type: none"> Big regional variation: Asian countries consume the widest range of OFSP-based end-products No 'standard path' or 'standard end state' <ul style="list-style-type: none"> China uses 40% of sweetpotato for animal feed, 30% is commercially processed for human consumption and only 20% consumed fresh In the U.S. the vast majority of OFSP is consumed fresh, and consumption has doubled in the last 5 years In Africa, processing sweetpotato is largely limited to boiling, steaming, and baking
Non human consumption	Animal feed Biofuels	<ul style="list-style-type: none"> OFSP offer additional applications in animal feed and potentially in biofuel, but all such applications are nascent in Africa

OFSP processing volumes can be grown in three different ways, each of which has its own advantages and disadvantages

OFSP processing volumes will grow if...

1. Buyers change their habit/behavior in favor of products containing OFSP in a noticeable way

Examples

- Bread containing OFSP (color noticeable at small % already – taste at higher percentages)
- Institutional buyers buying OFSP and OFSP products (school lunches, military meals)

Challenges

- Significant efforts are needed to change consumer behavior, with uncertain results
- Cost-conscious nature of buyers drives centralized procurement

2. Producers switch to using OFSP in invisible applications

- Inclusion of OFSP in biscuits at less than 5 – 10%
- OFSP as starch in yoghurt

- These are niche solutions that may not drive big scale for OFSP
- Relative cost savings for producers are likely to be low (since OFSP is only a small part of ingredients) and may not justify the investment

3. Producers who already work with OFSP, include OFSP from Malawi, Kenya or South Africa

- Exporting OFSP puree for further processing in baked goods, baby foods and other products

- High bar on food safety, traceability, quality and consistency of volume and quality may be difficult to meet, especially by smallholders

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

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**

Off-takers varied in terms of levels of success and interest in using OFSP which impacted their perspective

Typology of processors

Proactively interested processors

- Driven, for variety of reasons, to seek out OFSP processing
- Mix of those at verge of starting, those under way, and those who have tried but scaled back

Open to using OFSP if at no risk

- Open to considering OFSP but not strategic priority
- Need to see business case confirmed before making decision
- Need range of support, including capex, opex and capacity building to engage in OFSP

Not interested

- Other options take priority over OFSP
- Mix of those that got burned by cassava experience and conglomerates with very wide range of options



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Target countries grow OFSP mostly for household consumption and some commercialization, whilst industrialization is still nascent

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



Malawi, Kenya, and South Africa present different value chain and market characteristics, driving differences in potential for OFSP commercialization



Key market characteristics

- **4M households**
- Per-capita bread consumption: **4 kg**
- 3-year HH income growth: **-7%**

- **10.8M households**
- Per-capita bread consumption: **8 kg**
- 3-year HH income growth: **5%**

- **15.5M households**
- Per-capita bread consumption: **19 kg**
- 3-year HH income growth: **-6%** (middle class growing at 1%)

Key farming characteristics

- Av. farm size: **0.75 ha.**
- >90% OFSP produced by smallholder farmers
- 2.6% of land under irrigation; w/o irrigation **1 growing season**

- Av. farm size: **0.47 ha.**
- >90% OFSP produced by smallholder farmers
- 2.9% land under irrigation; w/o irrigation **2 growing seasons**

- Av. farm size: **430+ ha.**
- 50% OFSP produced by smallholder farmers
- 8.1% land under irrigation; w/o irrigation **1 growing season**

OFSP commercial opportunities

- Main opportunity is increasing consumption of fresh roots
- Still some nascent, small-scale business opportunities

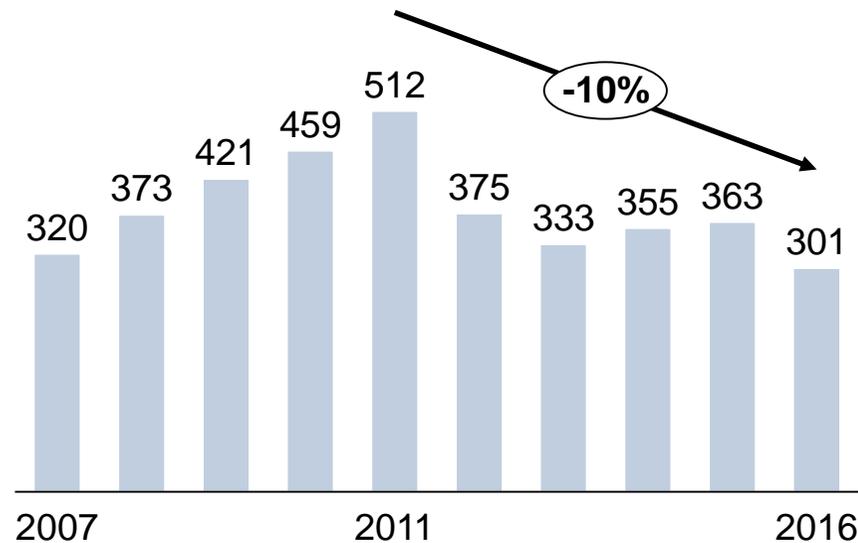
- Small commercial investment opportunity in pulp processing; lucrative export potential
- Still some opportunity in fresh root market

- Significant value possible in processing
- Limited impact potential for smallholder farmers

On demand side, a key constraint in the processed foods market is the low purchasing power, given declining household incomes and a growing lower class

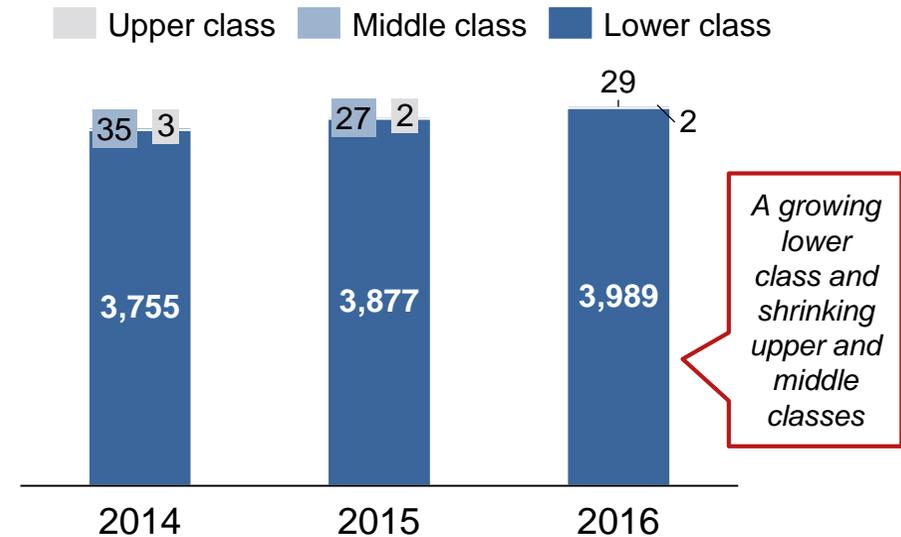
GDP per capita in Malawi

USD



Income distribution – Malawi: 2014-2016

Number of households by class category ('000)

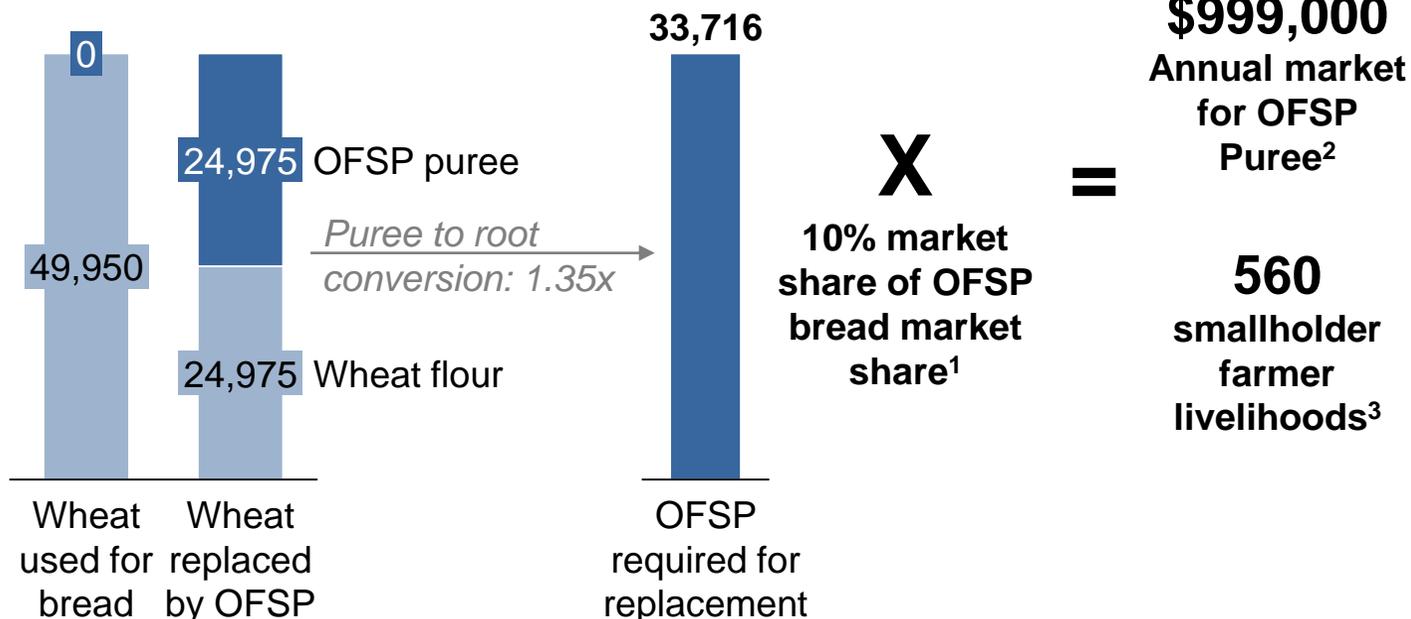


- Consumption of processed foods and bread specifically tends to rise with income and shows a step change when people grow into middle class income levels
- Given low and declining income levels in Malawi, consumption of processed foods and bread is likely to be low and under pressure, negatively impacting opportunities for OFSP processing

Thus, the largest processed market is still small: displacing 50% of wheat flour in 10% of baked goods would represent less than a \$1 million annual market

Wheat bread – current market size and opportunity

Tons per year



- **50% of the country's wheat consumption goes via informal retail stores** – excluded here as it's a fragmented, distributed play and would require changing the baking/cooking habits of a large number of individuals
- **Chips opportunity is tiny – nationally, only 900 tons potatoes/year processed commercially into chips**

1 Aggressive estimate of market share used to show that puree market is still very small; 2 at \$400 per ton of puree estimate by sinnovatek .

3 The unit of 'farmer livelihoods' indicates the number of (smallholder) farmers with an average landholding, that would be required to switch all of their production to OFSP in order to meet this demand. In reality, smallholder farmers almost always multi-crop which would mean a greater number of farmers would be impacted but with for a proportionally smaller portion of their income

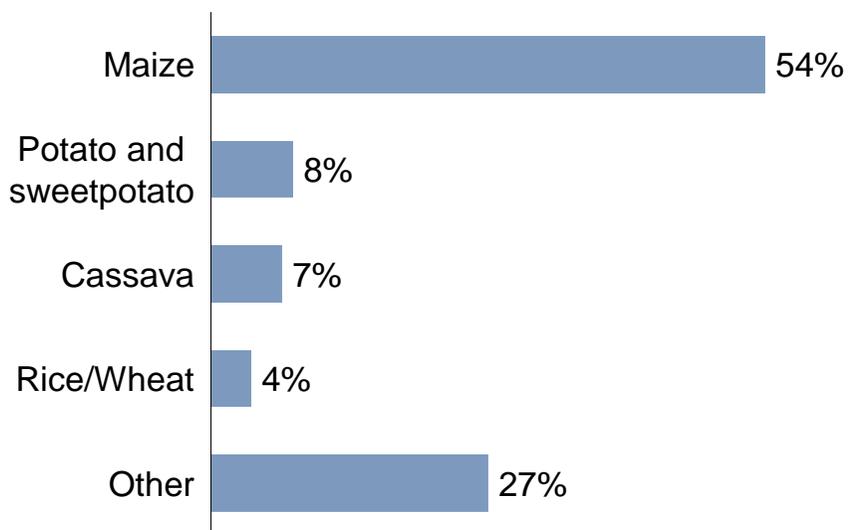
Biggest opportunity for OFSP growth lies in fresh market: people could consume OFSP more frequently and 1.8M non-consumer households could start eating OFSP

There is still room to increase calorie contribution of the sweetpotato relative to maize, which disproportionately drives household food consumption

And still 49% of rural and 26% of urban Malawian households report never consuming roots and tubers. This is a 1.8M household opportunity¹

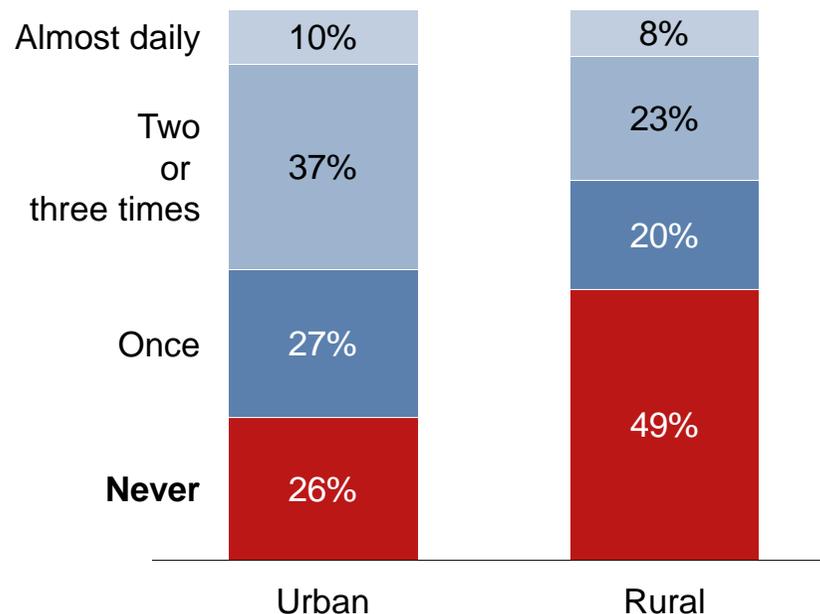
Share of caloric contribution – various crops in Malawi

Share of calories per crop, 2017



Weekly household consumption of roots/ tubers

Share of total households; 2013



¹In addition to getting households that never consume roots and tubers to consume OFSP, households already consuming roots and tubers (possibly including OFSP) could eat OFSP more frequently – substituting other roots and tubers. This may be easier to achieve than to ‘convert’ those not consuming OFSP

Malawi, Kenya, and South Africa present different value chain and market characteristics, driving differences in potential for OFSP commercialization



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In Kenya, sizeable, commercially attractive domestic demand could arise if OFSP puree can sustainably be cheaper than wheat and exports could also be interesting



PROCESSORS

~ 5M revenue possible in puree processing

To capture 8% share of bread replacement market



EXPORTERS

> 50% margin on exports to EU markets

For exports to UK and the Netherlands



PRODUCERS

~ 225% increase in farmer incomes

By switching from maize to OFSP

Opportunity

Considerations

- Driven by ability to achieve cost savings through reduction in puree production costs and securing partnerships with large bakeries
- Will require investments in scaling up processing to achieve economies of scale

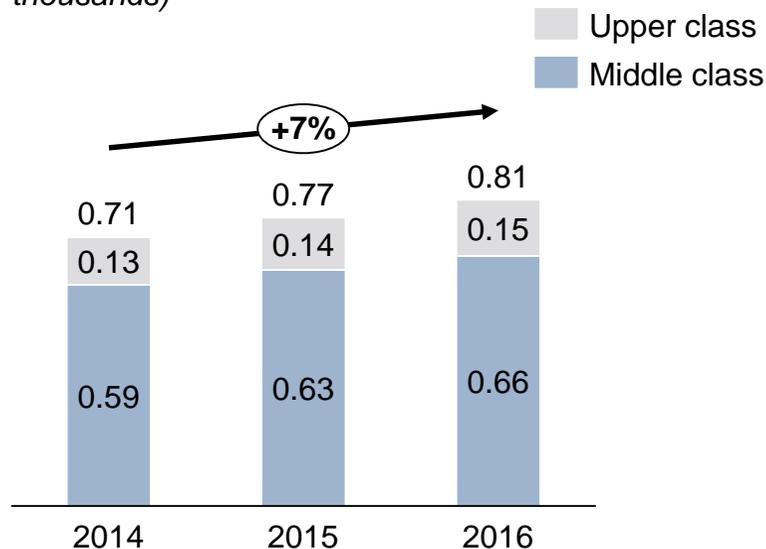
- Driven by ability to manage contaminants and spoilage to meet stringent quality standards of EU markets
- Will require investments in capacity-building, fumigation plants and cold-chain-enabled transport

- Driven by ability to command around USD 140 per ton for sweetpotatoes across two growing seasons
- Can be supported by donor activity to increase yields and link farmers to markets

As the middle class in Kenya grows, total processed food consumption increases, which opens up a potential market for OFSP bread

Class distribution, based on household consumption

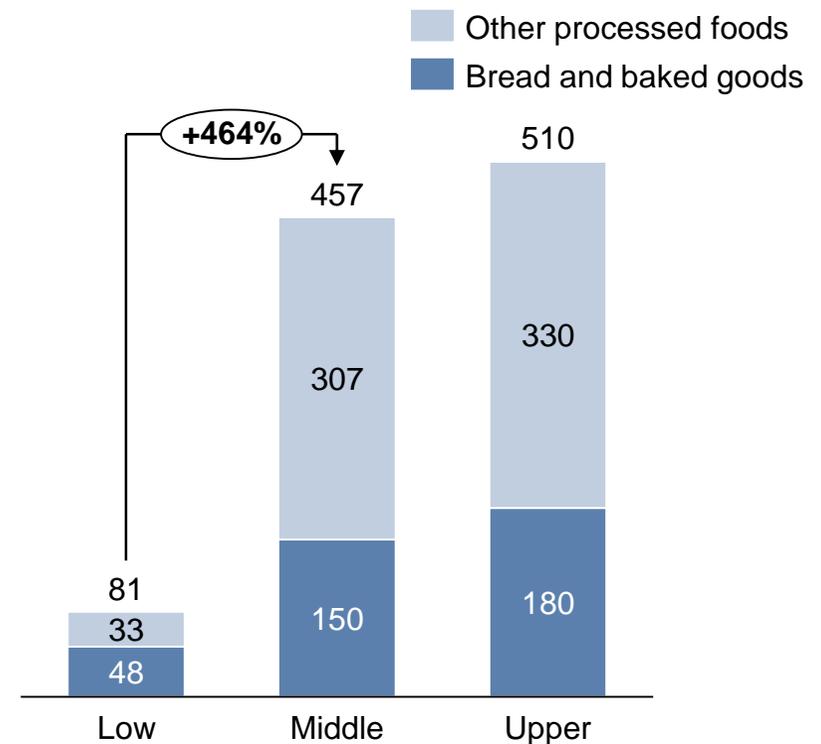
Households by consumption category (in hundreds of thousands)



- While large and growing, the middle and upper classes still represent < 8% of 10.8 million families
- An estimated 45,000 households moved from the lower class into the middle class over this period

Consumption of processed foods by class level

Number of grams per day, 2013



Various fundamentals are necessary to develop the market and for processors and investors to reap attractive returns

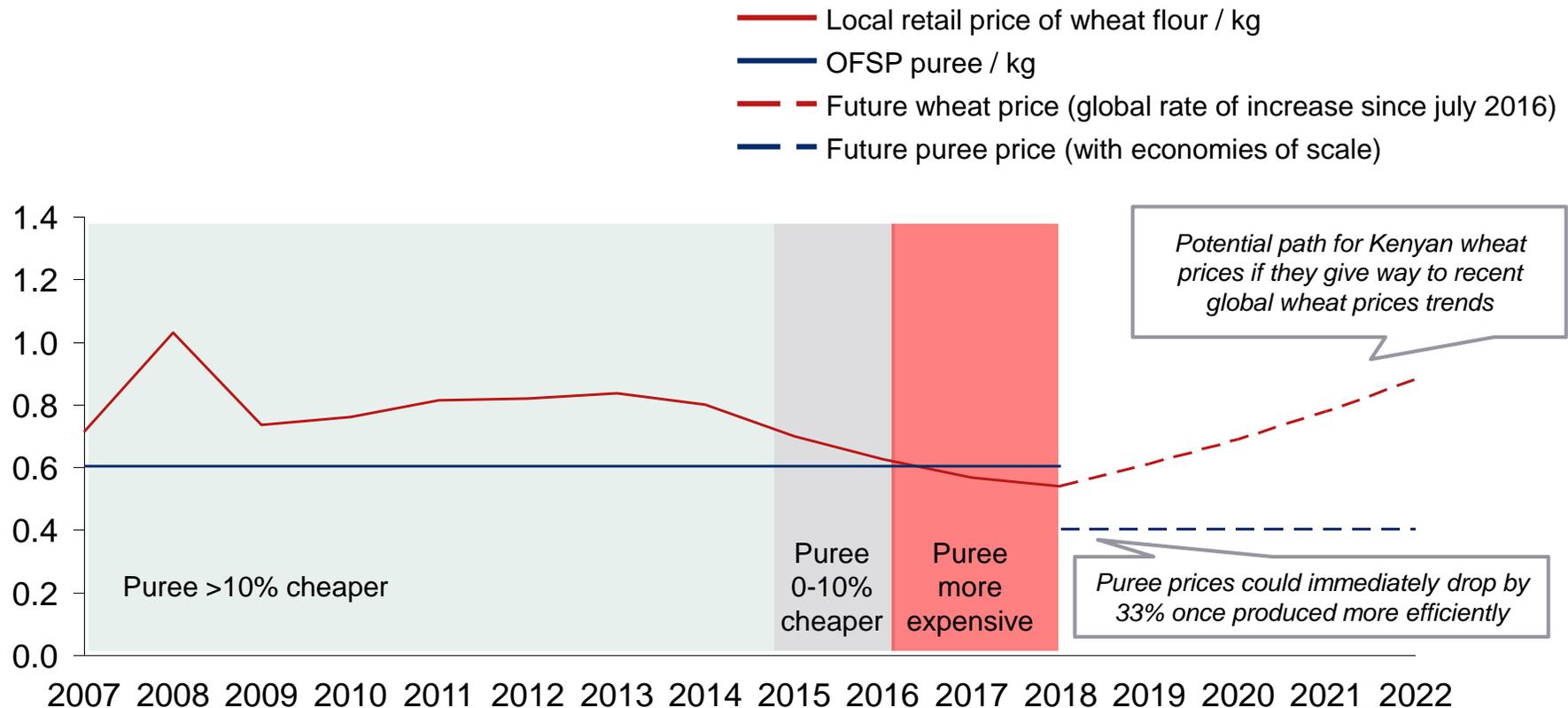
-  Highly achievable
-  Moderately achievable
-  Not achievable

Fundamentals for market capture	Achievability	Explanations
Initial demonstration of demand		Initial demand already demonstrated through Tuskys and Naivas bakeries: OFSP breads supposedly accounting for 8% of weekly bread sales, selling at a premium. If price premium is removed, market can be expanded further
Cost savings for bakers		Achievable, though depends on price of puree , which at large-scale production would be sensitive to root farm-gate price. Also dependent on price of wheat, but less concerning, as prices likely to follow recent growth
Availability and buy-in from large bakeries with scale		Large bakeries catering will be crucial to reaching market beyond Tuskys and Naivas, as three-quarters of households do not shop in supermarkets. The largest bakery, with 40% share of the national market, could absorb all 8% expected market capture for puree
Shelf-stable product		Moderately achievable; machinery to do this is available but has a relatively high minimally viable scale . If costs can be contained, can significantly expand market beyond major urban centers
Continued trends around bread consumption		Achievable; middle and upper classes still under 10% of all households in Kenya, and a 3x jump in daily consumption of bread (from 48 to 150 grams) is noted as consumers transition up into the middle class

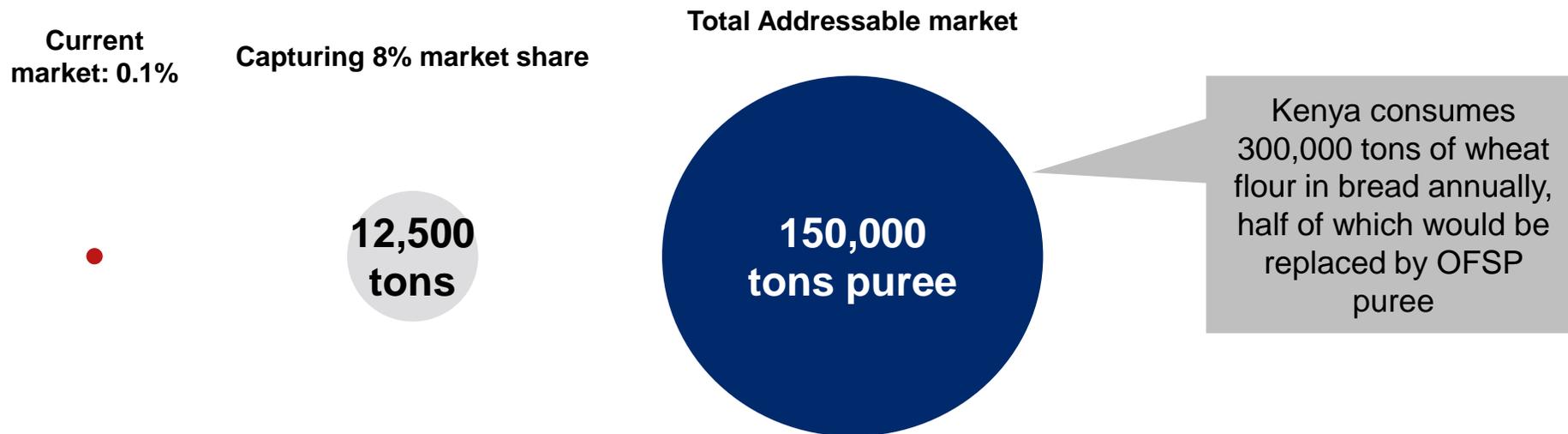
Concurrently, a recent increase in global wheat prices suggests puree could become considerably competitive against wheat flour in the next few years

Price competitiveness of OFSP puree vs. wheat flour – Kenya

Price in Kenya in USD (historical local prices according to exchange rate on April 29 of each year); 2007 - 2022



Using OFSP Puree in 8% of bread would drive a USD 5 million annual OFSP puree revenue stream and support ~1,380 smallholder farmer livelihoods



Capturing 8% market share seems feasible because

- OFSP bread has already grown to be 8% at Tusky's (across 10 outlets served)
- There is a cost advantage that may allow for price reductions (or increased marketing push by producers)
- A small health-conscious consumer base will purchase for health reasons
- The distinct flavor profile is favored by some

$$12,500 \times \$400 = \$5 \text{ million}$$

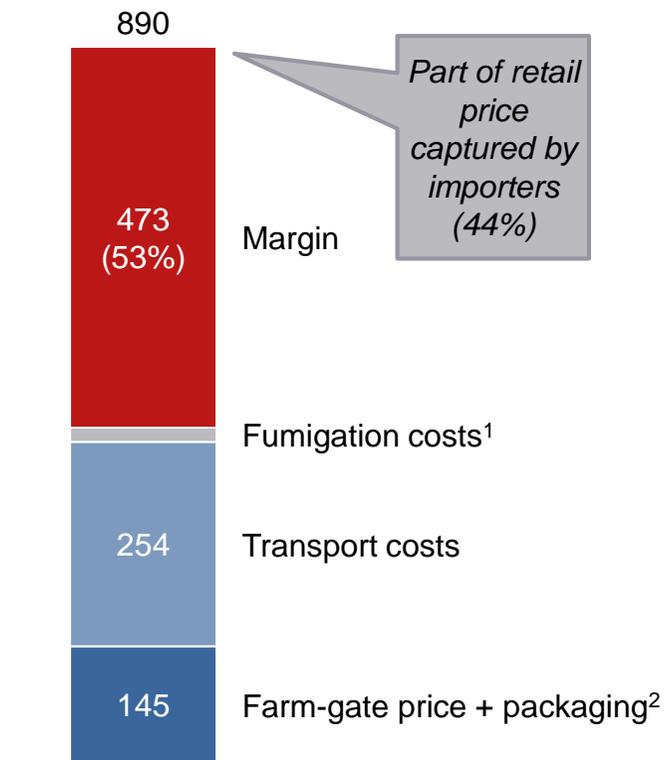
Tons sold Price per ton revenue

$$(12,500 \times 1.35) / (13 \times .47 \times 2) = 1,381$$

Tons sold Fresh to puree conversion Yield Lot size seasons Smallholder farmers supported

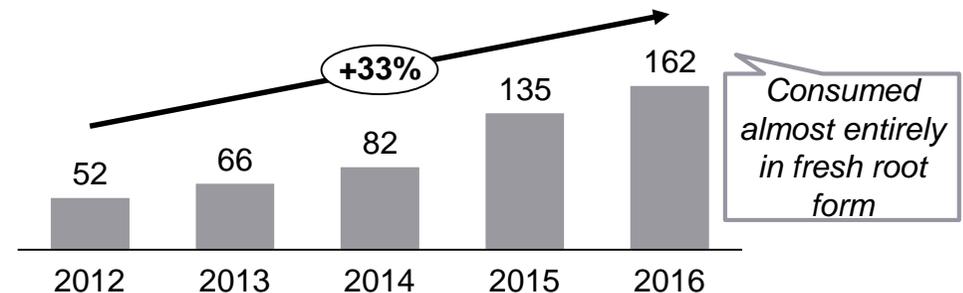
Kenya may also have an opportunity to export fresh roots to high-value, high-growth European markets where they could earn +50% margin per ton

Landed cost and margins into the EU from Kenya
USD per ton sweetpotatoes, 2013 (no tariffs)



- **Kenyan sweetpotatoes can earn high margins when exported to EU markets**, and have a significant buffer before an increase in farm-gate price could erode the margin (farm-gate price would need to reach USD 600, unprecedented for Kenya)
- **Kenya exports <1% of its production, mainly to Somalia**. It has had a **toehold into the UK, with an export volume of just 2 tons**, but it could export more given the fast-growing market for sweetpotatoes, favorable trade agreements with the EU for fresh agricultural products, and attractive economics
- **Areas for exploration to validate the opportunity:** costs of aggregation near farm-gate and for fumigation, preservability of the root during the journey, ability to meet EU quality standards

Imports of sweetpotatoes into the UK: 2012-2016
Tons ('000)



¹ Fumigation costs are proxy: fumigation costs for grain-based products at USD 0.40/cubic meter

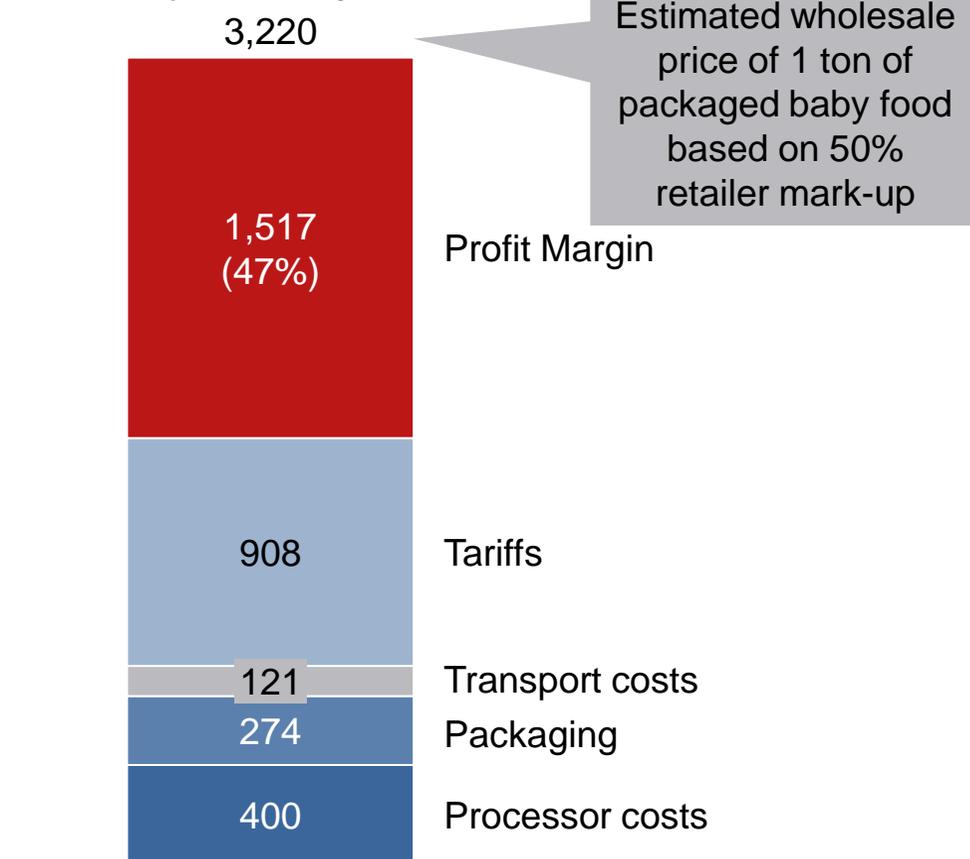
² Analysis uses USD 140/ ton for root price. Higher farmgate prices would obviously reduce margin

Source: CBI; Ministry of Foreign Affairs (2017) "Exporting fresh sweetpotatoes to Europe"; East Africa Online Transport Agency; [Sweetpotato density](#); Institute of Economic Affairs; Kenya Trade Notes; EU Trade Helpdesk; FAOstat; World Development Indicators; Dalberg analysis

There may even be economic value in exporting processed foods to the EU, despite a significant tariff on processed food imports

Example – Sweet Potato Baby food

USD per ton for puree baby foods



This opportunity should be tested further by assessing food safety regulations, packaging requirements and transport restrictions for food coming into the EU