

17th ICC International Cereal and Bread Congress

"Healthy Cereal diets from sustainable food systems"

Global Nutrition and Food Security Session

The Fortified Whole Grain Alliance: Fighting Malnutrition in Vulnerable Communities in Africa



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About the Fortified Whole Grain Alliance (FWGA)



A coalition of stakeholders that span across the food system - Including nonprofit and private sector partners and members, committed to increasing the global consumption of fortified whole grains (FWG).

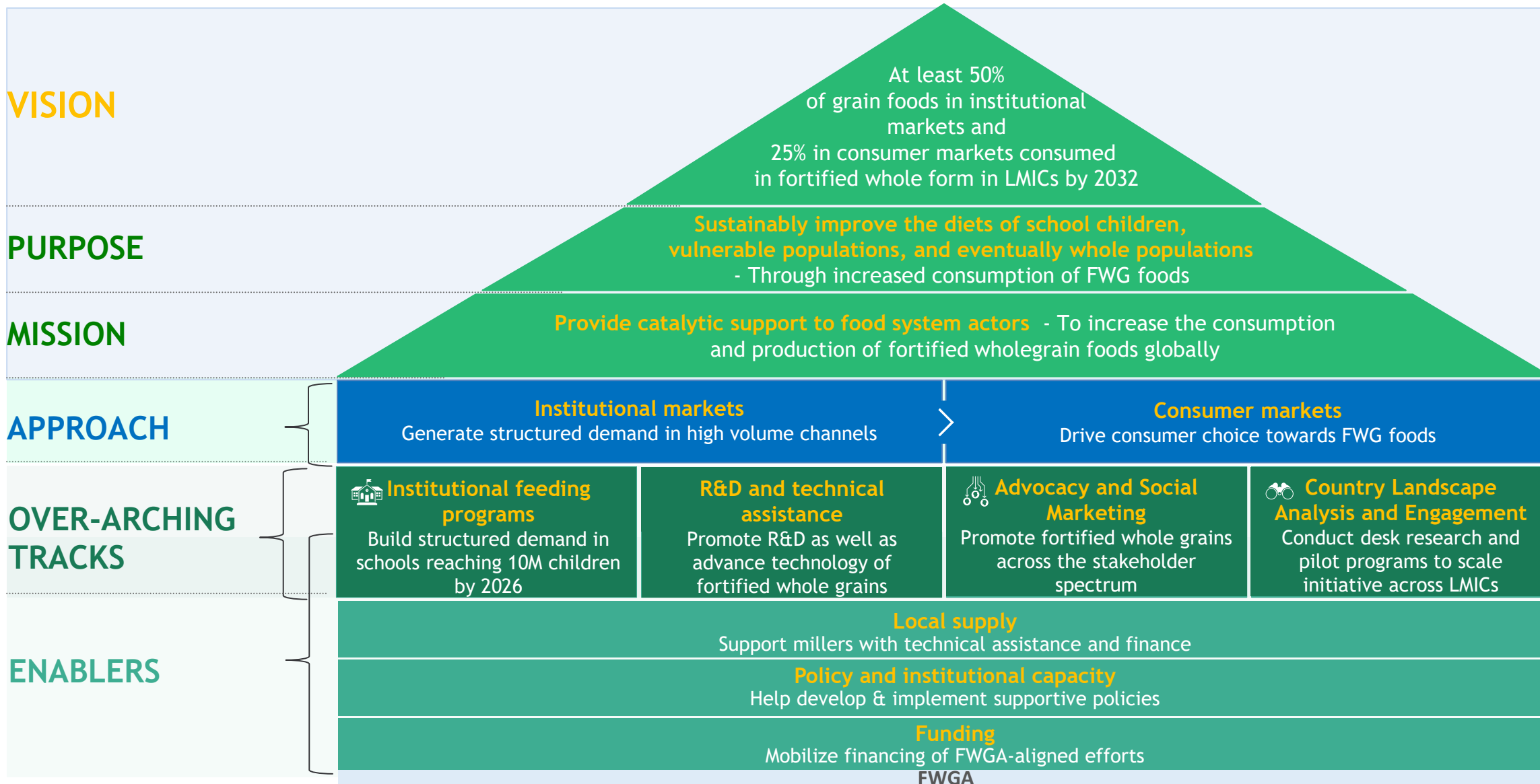
Committed to delivering its stated mission, purpose and vision - By bringing together the collective expertise, resources, operations, funding, visibility, and convening power of its partners.

As the Alliance grows - There will be additional partners that share the same vision & offer joint resource contributions, as well as members such as millers that will benefit by being part of the alliance.

The Alliance specifically aims to reach 10M+ people with FWG through its initiatives by 2025 - Across 5+ countries. Work is underway in 3 countries i.e., Kenya, Rwanda, and Burundi with initial focus on maize, rice, and wheat to shift to fortified whole grain. Studies also taking place in Egypt and West Africa.

Gradual expansion from the “Big 3” - To other grains (millets, sorghum, and neglected crops) and whole blends (with legumes, seeds, nuts, fish powder, etc).

VISION - FWGA aims to convert 50% institutional and 25% consumer grain consumption in Low- and Middle-Income Countries from refined to FWG by 2032 via demand & supply interventions



The Alliance has a breadth of experience with 11 Partners who provide their expertise and operational guidance and open up FWGA to a wider network



PARTNERS

A Partner is an organization that contributes various type of resources to the Alliance - knowledge, expertise, professional engagement, funds etc

FUNDING PARTNERS

Partners who have funded the Alliance activities



CORE PARTNERS

Key (incl. founding) partners with a wholistic outlook to the strategy and implementation of Alliance activities



IMPLEMENTING PARTNERS

Partners who primarily contribute in-kind to various initiatives, activities and functions of the Alliance



INSTITUTIONAL PARTNERS

Organizations that offer meaningful institutional association with the Alliance



The Alliance provides technical and financial support to over 50 Members and leverages their operational capacity to attain its overall vision

MEMBERS

A Member is an organization that looks to benefit from being associated with the Alliance e.g., prestige, access to technical experts etc

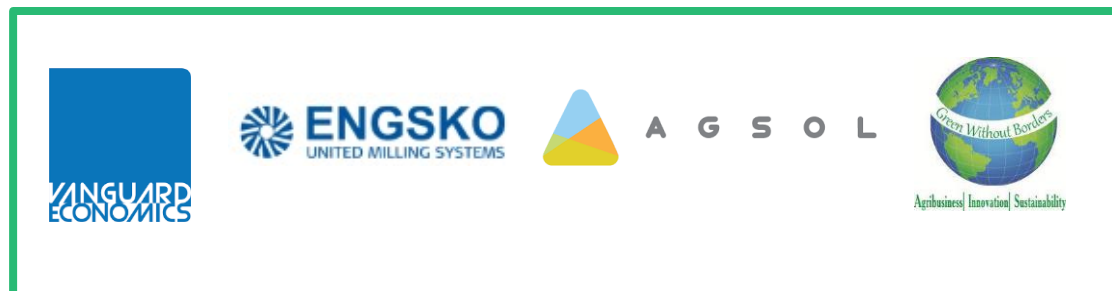
FOOD AND BEVERAGE MEMBERS

This includes millers, general food processors and beverage companies that are producers of FWG/FWB foods and beverages



GENERAL MEMBERS

Other private sector players e.g., marketing/financial services firms, equipment manufacturers, NGOs



AIM- Fortified whole grain foods & Whole blend foods to increase diet nutrient-density

Bran

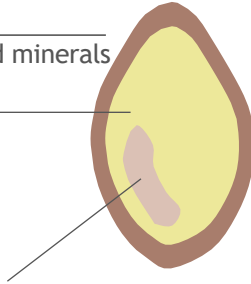
Fiber-rich outer layer with _____
B-vitamins, phytochemicals and minerals

Endosperm

Starchy carbohydrate middle layer with some protein (low quality) and fibre

Germ

Nutrient-rich with high quality protein, B-vitamins, vitamin E, bioactive compounds, and polyunsaturated fats



Refined flour foods

Starch, some low quality protein and fibre

Extraction rate
~70%

Whole grain foods

Vitamins, minerals, proteins, polyunsaturated fats, dietary fibre, and bioactive compounds

Starch and some low quality protein and fibre

Extraction rate
~100%

Fortified whole grain foods

Vitamin A B vitamins
Iron Zinc

Vitamins, minerals, proteins, polyunsaturated fats, dietary fibre, and bioactive compounds

Starch and some low quality protein and fibre

Extraction rate
~100%

Fortified whole grain blend foods

+ Nutrients from blending FWG with legumes and other nutrient-dense foods (nuts, seeds, fish powder, etc.)⁵

Vitamin A B vitamins
Iron Zinc

Vitamins, minerals, quality proteins, healthy fats, dietary fibre, and bioactive compounds

Starch and some low quality protein and fibre

Extraction rate
~100%

Endosperm
 Bran & Germ
 Fortification Nutrients⁴
 Blend Nutrients

1. Flour.com: Anatomy of a Wheat Kernel 2. Rockefeller: whole grain Manifesto 3rd April 2022 3. Pristinepremixes.com: Flour fortification process and components 3. whole grain Manifesto: Note - extraction rates vary and can go as high as 82% for refined flour 4. Standards of Fortification vary across countries and can include a combination, subset or additions to the ones mentioned on this page 5. Some water weight, up to 1.4% per kg, may be lost in the drying process

Cost comparison to produce 1 kg of Fortified whole grain maize flour vs. Refined maize flour for a Rwandan mid-sized miller¹

Input	Basis	Unit	Refined	FWG
Volume				
Output volume		kg	1.00	1.00
Extraction rate		%	71%	94%
Input volume		kg	1.41	1.06
Revenue				
Wholesale revenue ²	/output	RF/kg ³	575	575
By-product revenue	/output	RF/kg	125	-
Total revenue	/output	RF/kg	700	575
Cost of Goods Sold (COGS)				
Maize raw material	/output	RF/kg	(535)	(404)
Inbound transportation (maize to factory)	/output	RF/kg	(12.7)	(9.6)
Handling	/output	RF/kg	(14.1)	(10.64)
Labour	/output	RF/kg	(10.6)	(7.98)
Energy	/output	RF/kg	(15.5)	(17.6)
Packaging	/output	RF/kg	(8.00)	(8.00)
Fortification	/output	RF/kg	-	(4.00)
Other (incl. quality control, repairs, utilities)	/output	RF/kg	(9.5)	(9.5)
Total COGS	/output	RF/kg	(606)	(472)
Selling General and Administrative Expenses (SG&A)				
Outbound transportation (flour to schools)	/output	RF/kg	(20.4)	(20.4)
Rest of Flour SG&A	/output	RF/kg	(11.5)	(11.5)
By-product SG&A	/output	RF/kg	(2.5)	-
Total SG&A	/output	RF/kg	(35)	(32)
Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA)				
	/output	RF/kg	60	72
	/output	%	9%	13%

Green text shows advantage one has over the other


() shows negative values


1. Medium sized processors in Rwanda classified as having an installed capacity of 10-15 t/day given industry size 2. FWG flour set at price parity with refined flour 3. Average exchange rate between January and July 2022 (1 USD = 1020 Rwandan Franc) Source: Interviews with millers and experts

Where We Started - Pilot study demonstrated the feasibility of a large-scale, budget-neutral shift in school feeding towards FWG foods

The 18-month pilot programme¹ in Rwanda supplied 13,765 schoolchildren in 18 schools with FWG maize meal, demonstrating the potential to

Produce high quality FWG flour at the same cost as refined flours 

Shift consumer preferences towards healthier FWG foods 

Leverage institutional food procurement to improve diets for the most vulnerable in a budget-neutral way 

By the end of the pilot ...

73% of schoolchildren were aware of the nutritional benefits of FWG foods

97% of schoolchildren in Grade 6 preferred wholegrain maize meal to refined equivalent

> FWG adopted and expanded to 74,000 schoolchildren in 81 schools and included in school feeding guidelines; nearly 200,000 children currently reached across East Africa

1. The Rockefeller Foundation supported a pilot between August 2020 and December 2021 in Rwanda to replace refined maize flour in school meals with FWG flour. The pilot, implemented by Vanguard Economics in collaboration with the World Food Programme (WFP), developed an FWG maize flour for procurement by WFP for its school feeding program.



Making Ugali Maize Porridge in a School in Rwanda

Murang'a County in Kenya ECD Porridge Feeding | Pilot led to 4% increased enrollment & 65% improved attendance consistency; County is now feeding all 41,000 ECD learners with FWG

PILOT

- 314 Early Childhood Development centres
- > 20,000 children fed
- Flours evaluated in uji porridge: Finger millet, FWG Maize, Maize-Soya blend, Maize-Millet-Sorghum blend

90:10 FWG Maize-Millet blend was chosen due to its **combination of nutrition, taste & affordability**

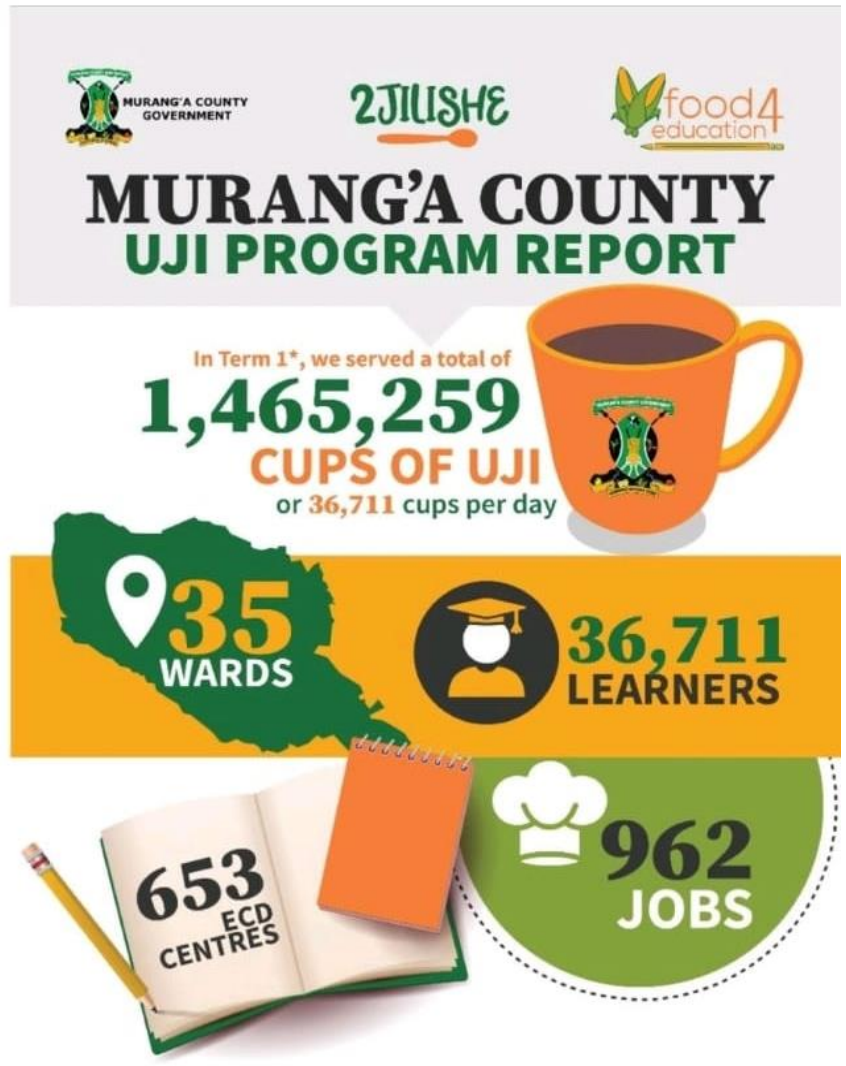
Food4Education NGA was able to cook, deliver, and serve **uji porridge at KES 11 per cup**, which was **KES 4 per cup cheaper than previous uji programs**

This pilot established **4.2% increased enrolment** and **64.7% attendance** for the duration of the implementation period. Additionally, **consumption patterns were at 96.8%**

The county government committed to feed all the Murang'a county ECD learners with this FWG porridge flour

Note: Respondents sampled include 16 cooks, 95 centre managers, 72 head teachers and 95 children

SCALE UP



*The Term 1 duration indicated is from 20th Feb 2023 to 19th Apr 2023.



At Mill in Rwanda - Investigating Hot-air Drying of Maize to below Normal Moisture Content With the Aim of Extending the Shelf-life of Fortified Whole Grain Maize Meal



Locally made maize degerminator



Hammer milling



Some of the team and the results

Investigating Degerminating, then Heat-treating the Germ+Bran and Recombining into Whole Grain Meal in mill in Rwanda

Technical Assistance | Complementary to technical visits and funding, We have developed a technical guide for use by small/medium scale millers

- • **Objective:**
The technical guide seeks to provide essential information, serving as a guide to small and medium scale millers interested in processing of Fortified Whole Grain (FWG) flours
- • **Content:**
 - **Introduction to whole grain foods**, including their benefits and challenges in whole grain milling and flour quality
 - **Explanation of whole grain processing**, including the importance of quality of inputs
 - **Benefits of fortification**, including costs and benefits to the miller, importance of monitoring and control, and guidelines on packaging
 - **Introduction to Fortified Whole Blends**, including key benefits
- • **Impact:**
Millers use this guide to understand more about the benefits of fortified whole grains and understand best practices in terms of processing, storage and fortification



R&D | In accelerated shelf-life studies; shelf life of 4.5 months observed from thermal treatment of maize from grain drying

University of Pretoria Shelf-life R&D studies

Determining the best ways to optimize the shelf life and nutritional value of FWG maize flour through:

- 1 Thermal treatment of maize (grain drying)
- 2 Thermal treatment of crushed grain
- 3 Addition of antioxidants (e.g., Vitamin E, Citric Acid)
- 4 Packaging
- 5 Degradation of phytates
- 6 Encapsulation of riboflavin

Accelerated shelf-life studies key findings:

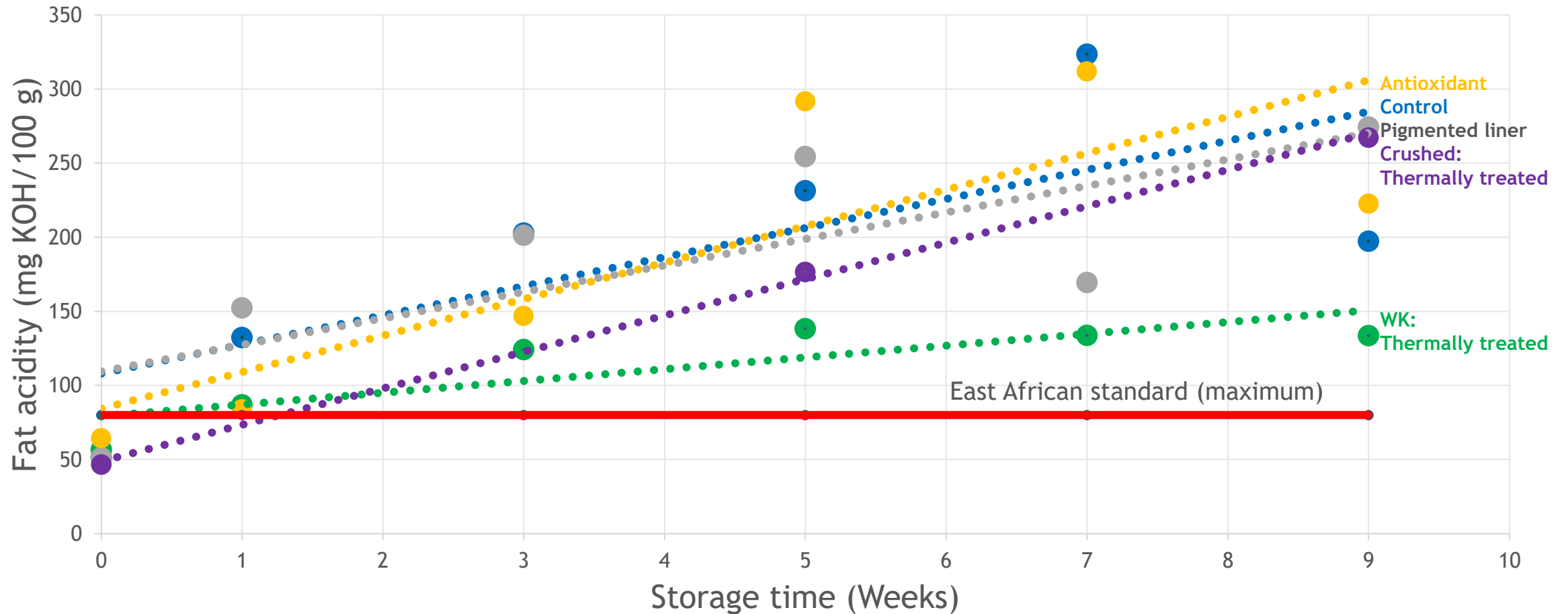
- Rates of hydrolytic and oxidative **rancidity development slowed down** by drying the grain to **11.5%** moisture and below
- Predictive fortified maize whole grain flour **shelf life at least 4.5 months** at a mean temperature of 25°C

Reduction in moisture level from **13%** to **11.5%** achieved

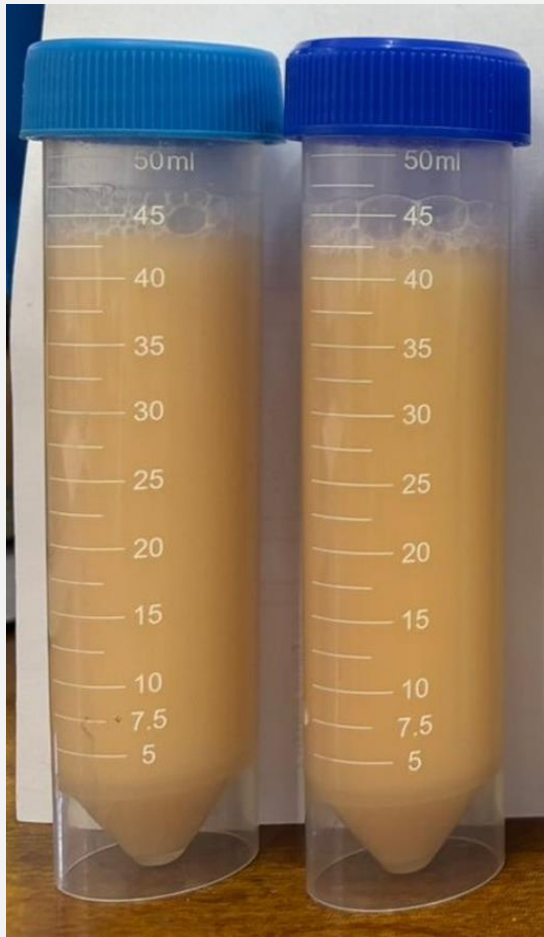
☆ **Currently undertaking Real-time Shelf-life Studies** aiming to achieve a **shelf life of 6+ months**

R&D: Hydrolytic Rancidity development - Accelerated storage at 40°C

-Effects of thermal treatment of whole and crushed maize kernels, pigmented packaging liner and antioxidant on stability of whole grain maize meal



R&D: Oxidative Rancidity Peroxidase Activity in 4-month Stored Maize Meal from Thermally treated Maize



Fresh mm Fresh mm



Low alt1 Low alt2 Low alt(Control) High alt1 High alt2 High alt(Control)

Control = No guaiacol substrate added

- **65°C Thermal treatment of maize grain complete inactivates peroxidase activity (and probably other oxidative enzymes)**
- **Finding contrary to that with oats, where peroxidase is more thermostable than lipase**
- **However, similar to findings with pearl millet, which like maize is a C4 tropical cereal, unlike oats**

Sustainability | Commercial market development is a key next step for the sustainability of the Fortified Whole Grain Initiative

- To ensure the initiative will be sustained beyond the initial funding period, demand creation and building of a strong supply chain supported by millers focusing on local supply is key
- The Alliance is working closely to enable millers to supply FWG products to institutional markets in the short term and subsequently develop and launch their own brands in consumer markets
- To support demand creation, the Alliance has developed an FWG stamp as a certification model that will build consumer trust once identified on product packaging. The stamp will be linked to communication messaging in category & brand campaigns
- Various brands have already been developed for both retail as well as institutional markets in Kenya and Rwanda



Thank you
Merci beaucoup



FORTIFIED
WHOLE GRAIN
ALLIANCE

www.fwg-alliance.org