



ENHANCING THE NUTRIENT BIOAVAILABILITY OF FOOD AID PRODUCTS

Summary of a Report from the Food Aid Quality Review Project (FAQR)

BACKGROUND

Prior research has made numerous recommendations relating to specialized food aid products, many of which have been put into use. In FAQR's current phase of work, it was decided that a new focus on nutrient bioavailability was needed. Bioavailability of nutrients is a function of the food consumed (food matrix) and the response of the consumer to effectively utilize the ingested food (dependent on additional factors like age, health, gut health, diseases etc.). **The level of nutrients is not the most critical factor; it is the ability of the nutrient to be released from the food matrix and utilized by the body that ultimately determines benefits to the consumer.**

	<p>Food Matrix "The nutrient and non-nutrient components of foods and their molecular relations to each other" (USDA NAL Glossary, 2016).</p>		<p>Nutrient Bioavailability "The proportion of intake that is capable of being absorbed by the intestine and made available for metabolic use or storage" (Lowe and Wiseman, 1998).</p>
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INTRODUCTION

Food aid products are formulated with the intention of treating or preventing different forms of undernutrition, but **previous studies have failed to investigate nutrient bioavailability as a contributing factor to overall health outcomes.** The [Enhancing the Nutrient Bioavailability of Food Aid Products](#) report reviews the state of science on the role of food matrices in impacting nutrient bioavailability. It **examines the effects of different food aid products in addressing undernutrition by understanding the gaps in food matrices and suggests ways to improve the nutritional efficiency of these foods.** The goal was to identify areas of improvements; a snapshot of challenges and recommendations is as follows:

Challenges

Increasing **energy density**, which plays a critical role in catalyzing positive health benefits for food aid recipients.

Improving **protein digestibility** for better utilization of protein by the body.

Addressing **antinutritional factors** in food aid products, which impair uptake of certain minerals.

Determining sources of **good quality protein** that are cost-effective.

Achieving the proper balance of competing **essential fatty acids**.

Recommendations

1. Include diastatic malt in fortified blended foods (FBFs).

2. Add defatted & toasted wheat germ and synthetic amino acids to make protein-enriched products.

3. Include oils rich in ω -3 fatty acid, e.g. canola oil.

Challenges

Modifying the food matrix to influence the gut microbiota/ improve **gut health**.

Resolving issues of **mycotoxin contamination** to reduce consumption of infected foods.

Optimizing processing to make food aid products more nutritious, shelf stable, and cost-effective.

Recommendations

4. Add oligosaccharides/ prebiotics to food aid products.

5. Add yeast cell components, like cell wall, to bind mycotoxins.

6. Implement compaction of FBFs in processing to lower volume and improve shelf life.

CONCLUSIONS

Nutrient bioavailability is in large part determined by food matrices. The incorporation of the recommendations (in the graphic above) in part or completely would result in food aid products with higher nutritional bioavailability. Implementation of some recommendations may require additional costs. However, the **increases in cost may be justified by the improved health outcomes**, ultimately allowing for more “cost-effective” and sustainable products.

NEXT STEPS

The list of recommendations must be field tested to understand appropriate dosage, feasibility of use in field and changes in measurable health outcomes to make it truly “cost-effective.”

FULL REPORT

Joseph, Michael; Alavi, Sajid; Johnson, Quentin; Walton, Shelley; and Webb, Patrick. 2019. Enhancing the Nutrient Bioavailability of Food Aid Products, Report to USAID, Boston, MA: Tufts University. ([Read Here](#))

RELEVANT REPORTS

Joseph, Michael; Griswold, Stacy; Alavi, Sajid; Green, Lindsey; Johnson, Quentin; Walton, Shelley; and Webb, Patrick. 2019. Effect of Cooking Methods and Formulation of Fortified Blended Foods on the Food Matrix and Nutrient Bioavailability: An Experiment from FAQR, Sierra Leone Four Foods Study. Boston, MA: Tufts University. ([Read Here](#))

Joseph, Michael; Alavi, Sajid; Johnson, Quentin; Walton, Shelley; and Webb, Patrick. 2018. Food Matrices: A Review of Critical Factors Impacting Nutritional Bioavailability, Report to USAID. Boston, MA: Tufts University. ([Read Here](#))

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