Fortified Blended Foods

Keely Johnston, Bee Ramos, Erika Weissenborn
Agenda

- Introduction
- FBF Background
- Cultural Significance
- GAME
- Political, Social & Economic Issues
- Conclusion
- Questions
World Food Program - FBF

- FBFs contain adequate calories (400kcal/100g) and protein (15g/100g)
- Fortified with essential micronutrients
  - Usually missing from the diet
- Pre-cooked and distributed as flour
  - Easy to prepare, low fuel requirements
- Easy to digest for young children
- Relatively inexpensive
  - More sustainable
- Versatile food – can be prepared in a number of ways
FBF Worldwide Distribution

- Africa (>50%)
- Asia (20%)
- Latin America and the Caribbean: 15%

(Rowe et al., 2008)
FBF Background
Wheat Soy Blend (WSB)
Corn Soy Blend (CSB)

- Corn Meal
- Soy Flour
- Soybean Oil
- Mineral and Vitamin Premix
Soy Fortified Bulgur

- Bulgar
- Soy grits
## Vitamin/Mineral Premix

<table>
<thead>
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<th>Target</th>
<th>Chemical Form</th>
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<tbody>
<tr>
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<td>Dry vitamin A palmitate</td>
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FBF Standards

- Federal Food, Drug, and Cosmetic Act (USAID)
- Codex Alimentarius (WFP)
FBF Safety

HACCP
• Hazard Analysis and Critical Control Points

GMP
• Good Manufacturing Practices
Processing

- Methods of processing:
  - Extrusion (wet or dry)
  - Roasting
Effects of Processing on FBF

- Improved digestibility of starches and proteins
- Inactivates anti-nutritional factors
- Maillard Browning
Final Product Specifications

- Urease Test
- Nutrient values
- Flour size
- Microbiology
- Aflatoxins
- Peroxide value
- Dispersiveness
- Bostwick test
Packaging and Storage

- 25 kg bags
  - Polypropylene
    - Rip-proof
    - Moisture barrier
    - Sealing

- Shelf life
  - Minimum one year when stored at ambient temperatures prevalent in country of destination
Culturally Appropriate FBF

To ensure FBF meet the cultural and nutritional needs of a community an organization must:

- Identify traditional recipes and ingredients
  - Fortified blended food recipes (WFP)*

- Understand food preparation customs
  - Are they consumed immediately after prepared?
  - Cooking time and temperature
    - Do traditional cooking methods reduce micronutrient content of food?
  - Typical times for meals and number of meals per day

(Rowe, et al., 2008)
Culturally Appropriate FBF

- Define how the product will reach target populations
  - Wet feeding sites?
  - Local programs, distribution centers, door-to-door delivery
  - Average household size?
    - Ration size- per household or per person

- Evaluate resources available in a community
  - Is fuel for cooking available?
  - Where does food preparation take place?
  - Cooking equipment: cast iron or clay pots?
  - Water – is clean water available or boiled before use?
    - Objective measurements to determine water quality
      - pH, microbial counts, turbidity

(Rowe, et al., 2008)
Case Study: Guatemala

- Foods Consumed in Guatemala that can be prepared with FBF

  - Cookies
  - Vegetable Stew
  - Food Drink
  - Tortillas

- FBF distributed in Guatemala: Soy fortified bulgur not corn soy blend (CSB)

- FBF - mixed with oil (fortified), sugar, water, vegetables

(Rowe, et al., 2008)
Product distributed to
- Households participating in **maternal and child health programs** in Central Guatemala, province of Baja Verapaz, Quiche province
- Guatemalan private voluntary organizations distributed vegetable oil fortified with Vitamin A
- Recipients transferred oil into plastic bottles at distribution sites

(Rowe, et al., 2008)
Case Study: Guatemala cont’d

- Food preparation
  - 98% of Guatemalan beneficiaries followed WFP recipes
  - Often included herbs, bananas and cinnamon in meals
  - Location: covered areas away from sunlight
  - Tortillas and cookies: baked for 15-20 minutes
  - Vegetable stew and thin porridge: boiled
Case Study: Malawi

Thin Porridge
*Phala*

Food Cake
*Chikondamoyo*

Banana Leaf Rolls
*Mkate*

Thick Porridge
*Nisma*

(Rowe, et al., 2008)
Case Study: Malawi cont’d

- Product distributed to
  - Households participating in **food for work, chronically ill and orphan household programs** in Dedza District, Mchinji District and Thyolo District

- At least 75% of daily diet in Malawi derived from food aid

- Vegetable oil fortified with vitamin A used as an ingredient to prepare FBF

(Rowe, et al., 2008)
Resources

- Wood fueled fire
- Aluminum or clay pots
- Water
  - Boreholes or open wells
    - pH range: 4.7 to 7.7
  - Water boiled

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of households</th>
<th>% of households</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Borehole</td>
</tr>
<tr>
<td>Uganda</td>
<td>21</td>
<td>42.9</td>
</tr>
<tr>
<td>Malawi</td>
<td>41</td>
<td>34.1</td>
</tr>
<tr>
<td>Guatemala</td>
<td>35</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>23.5</td>
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(Rowe, et al., 2008)
Haiti: Quake Kids Get Nutritious Breakfast

http://www.wfp.org/countries/Haiti/Media/Haiti--Starting-Over-From-School
GAME: HELP DELIVER FBFs AROUND THE WORLD!
Political, Social & Economic Issues
Target Population

- Children suffering moderate malnutrition
  - Due to constraints including poverty, political instability and food insecurity.

- Vulnerable Groups
  - Pregnant and lactating women
  - Chronically ill-HIV/AIDS and TB

- People affected by disaster-related emergencies
  - Refugees, natural disaster

- Populations requiring food assistance
  - Drought, lean/bad harvest periods

- Populations who consume monotonous diets
  - Root vegetables

(De Pee & Bloem, 2009)
Malnutrition

- Stunted Growth
  - Low Height for Age
  - Signs of Chronic Malnutrition
  - Irreversible
  - Linked to premature death

- Wasting
  - Low Weight for Height
  - Acute Malnutrition
  - Starvation/Disease
  - Can be reversed
The Intergenerational Cycle of Malnutrition
World Food Program

- Malnourished Women
- Stunted Adolescents
- Low Birth Weight Babies
- Stunted Children
Question:

How does the intergenerational cycle of Malnutrition affect a Country's economy?
Breaking the cycle of malnutrition

One of WFP's main goals with Fortified Blended Foods is to try to diminish the devastating cycle of intergeneration malnutrition.
Distributors

- Main Distributor: World Food Program
- Secondary Distributors: Various NGOs
- World Food Program receives the bulk of the Fortified Blended Food products from the US.

How is this affecting the beneficiary's economy?
Fortified Blended Foods and Genetically Modified Organisms: Case Study

Can beggars be choosers?

- South African 2002 food crisis
  - 26% of the population had critical food shortages
  - USA responded with food aid

- Malawi, Mozambique, Zambia, Zimbabwe rejected US food aid because it contained GMOs

- Concern of health consequences, agricultural biodiversity, future exports

- USA says “a crime against humanity!” “Beggars can't be choosers!”
Local Economies and WFP

- WFP does receive the bulk of funding and supplies through the US (excess?)

- The WFP is making initiatives to produce Fortified Blended Foods locally
  - Helping local economies

2 examples: Kenya and Liberia
Local Production of FBFs
A success story: Kenya
Economic Hardships and FBF

- Barrier between iron/zinc requirements of infants/children and what FBFs can provide

- This gap can easily be filled by
  - consuming animal sourced foods
  - further fortification

Do you have any ideas of how to overcome the barrier between FBFs and children's need for iron and zinc?
Product improvement needed

- FBF do not meet the nutritional needs of moderately malnourished children
  - Inadequate micronutrient content
    - Insufficient iron, no vitamin C
    - Low content of essential fatty acids and fats
  - High anti-nutrients and fiber content
    - Non-dehulled soy,
    - Non-degermed maize and wheat: higher fiber content
  - Insufficient energy per serving
    - High bulk and viscosity
  - Does not provide a source of animal protein
    - Powdered Milk

(De Pee & Bloem, 2009)
Improvements and recommendations

- **Improve nutritional content and absorption**
  - Changing the micronutrient premix
    - Increase content and bioavailability of nutrients
  - Adding milk powder
  - Increasing oil content
  - De-germing maize and de-hulling soy
  - Reducing phytate content with the addition of phytase enzyme
    - Phytase not GRAS

- **Improve Product Quality**
  - Include specifications for maximum content of heavy metals.
  - Reduce content of toxins and contaminants
    - lower maximum level for aflatoxins (5 instead of 20ppb)
    - Enforce tighter specifications for microbiological content

(De Pee & Bloem, 2009)
Questions?
References

FBF Background


Culturally Adequate


Political, Social, and Economical Issues