Rice Fortification and the Role of Public-Private Partnerships

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Why Fortify Rice with Vitamins and Minerals?

Three main benefits of staple food fortification:

1. Improved Health
2. Increased Productivity
3. Economic Progress

- Micronutrient deficiencies affect 2 billion people worldwide, and is one of the main causes of poor health and disability
- Staple food fortification is a proven and very cost effective strategy to address micronutrient deficiencies
- Rice is the main staple for 3 billion people, concentrated in developing countries.
- Rice fortification enables consumers to improve their micronutrient intake without changing their buying and eating habits
- Time is right: fortifying rice to address deficiencies is supported by governments, industry stakeholders and key global organizations.
Essential Elements in Partnership

Commitment

Policy and Regulations

Supply Chain
Market development and demand
Consumer awareness

Coordination
Knowledge management
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<th>ACTIVITY FOCUS</th>
<th>MAIN PARTNER</th>
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| • Facilitation of technical assistance:  
  • Policy making and supply chain  
  • Cross-agency coordination  
  • Ability to Monitor and Evaluate | WFP |
| • Technical support on extrusion and fortification  
  • QC/QA, good storing practices | Private sector  
  (local and multinational) |
| • Science based:  
  • Policy and standard setting  
  • Monitoring & compliance  
  • Consumer awareness (labelling and dissemination) | Public sector |
Main product technical attributes

Basis for technical assistance and partners’ expectations.

- Good contribution to micronutrient intake
- Safe even at high consumption levels
- Acceptability: indistinguishable from non-fortified rice
- Comparable shelf life + handling requirements to head rice
- Standard setting
- Technical needs (Fortified Rice Kernel, blending)
- Supporting Infrastructure: Analytical labs, inspection services, logistics & transport, consumer communication
Attributes as basis for technical assistance

Main attributes

- Good contribution to micronutrient intake
- Safe even at high consumption levels
- Acceptability: indistinguishable from non-fortified rice
- Comparable shelf life + handling requirements to head rice

Discussions

- Standard setting
- Processing needs (FRK, blending)
- Supporting Infrastructure: Analytical labs, inspection services, logistics & transport, consumer communication
Processes in a Nutshell

**Step 1: Create Fortified Kernels**

**Method 1**
- Rice Flour
- Extrusion
- Extruded - Fortified Kernels
- Vitamin & Mineral Powder Mix

**Method 2**
- Milled Rice
- Coating
- Coated - Fortified Kernels
- Vitamin & Mineral Coating Mix

**Step 2: Blend fortified kernels with milled rice**
- Milled Rice
- Fortified Kernels (~0.5-1%)
- Fortified Rice

Source: Food Fortification Initiative
Value Chain of Rice Fortification – Risk

**REGULATORY FRAMEWORK**

**INPUTS**
- Premix, broken rice, additives, water

**Production of fortified kernels (FK)**
- Dosage Process constrains (T/t)
- Nutrient degradation

**Transport and storage of FRK to point of blending**
- Nutrient degradation

**Blending of FK with normal rice**
- Adequate dosage
- Nutrient degradation

**Sales or distribution of fortified rice**
- Nutrient degradation

**RETAIL**

**CODEX Codes of Practice for Quality and Safety assurance**
Stakeholders Roles and Responsibilities

• The Processor
  – Ensure production of safe food product according to specification
  – Implement system: **GMP/HACCP, document it & maintain records**
  – Proactively **dialogue with regulatory bodies** on standards & ensure efficient & effective integration of industry & official food control systems

• Handlers
  – Implement good handling practices/ storage practices....

• The Government
  – Create an enabling environment: **scientific, technical, financial, infrastructure, regulatory** - compliance by stakeholders
  – **Guarantor of the system**
# Rice Fortification Enablers & Barriers

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<th>Enablers</th>
<th>Barriers</th>
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<tr>
<td>High rice consumption per capita (the staple food), and local production of rice</td>
<td>Low awareness among consumers, millers and other stakeholders (health effects, MNDs)</td>
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<td>Presence and experience with other food fortification programmes (e.g.: salt, oil)</td>
<td>Insufficient monitoring capacity (quality control, laboratories, enforcement capacity)</td>
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<td>Multiple actors in the private sector that provide options to SMEs</td>
<td>Access to technology, IP issues</td>
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<td>Proven acceptability</td>
<td>Insufficient local production of fortified kernels (scale and cost-effectiveness)</td>
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<td>Low cost of fortification to address micronutrient deficiencies</td>
<td>Fragmented milling landscape and many small mills: Value chain difficult to scale up</td>
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<tr>
<td>Standard in place</td>
<td>Insufficient monitoring capacity (quality control, laboratories, enforcement capacity)</td>
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<td>Strong financial incentives for governments to address micronutrient deficiencies</td>
<td>Lack of financing for implementation</td>
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Rice fortification main takeaways from Asia

• In Asia
  – WFP supports 10 countries in various aspects of the implementation: policy and strategic advice, capacity development, technology transfer, etc.
  – Partnerships are crucial due to diverse needs

• Continuous improvement based on stakeholders communication

• Improved stakeholders communication is needed to drive consumer demand and generate increased donor interest.
Rice Fortification in the DSM/WFP partnership

Aligned with DSM strategy & WFP strategy & SDGs (2 & 17)

Work stream goal partnership
- Knowledge body
- Advocate for fortified rice
- WFP food basket
- Commercial market to reach economy of scale

Accomplishments so far
- Leading (technical) partners
- Joint strategy
- Growing evidence base
- Recommendations & WFP fortified rice spec
- Advocacy
- Key publications
- Demand and supply growth
- SOPs, best practices, guidelines & protocols
Key Challenges for rice fortification in Asia

- For mandatory rice fortification rice industry consolidation and modernization a prerequisite
- Fragmented milling landscape and limited central processing of rice
- Need for strong business case & success stories in Asia
Partnering makes the goals more reachable, despite challenges

**DSM provides**
- Scientific Knowledge, R&D and Product Development
- Human Resources and Capacity Building
- Funding
- Respected Brand linked to Quality Products
- Private Sector Contacts

**WFP provides**
- Footprint in 80+ Developing Countries
- Logistical Expertise and Distribution Network
- Understanding of Local Cultures & Needs
- Respected and Trusted Worldwide Brand
- Local Governmental & Civil Society Contacts
- (Social) Media Reach

**Outcomes are**
- Both partners contributing to the partnership based on their resources and expertise.
- So far we have conducted 30 projects in 15 countries and reached >25 million WFP beneficiaries with improved nutrition.
Which Micronutrients to Add to Rice?

Similar to maize and wheat flour fortification WHO guidelines:
- Iron
- Folic Acid
- Vitamin B12
- Vitamin A
- Zinc

Micronutrients lost during policing (milling) can be added back:
- Thiamin (B1)
- Vitamin B6
- Niacin (B3)

Many others micronutrients are also possible to add in case of public health need or commercial interest: Vitamin E, Vitamin D, Selenium, Protein (e.g. Lysine), Fibers, Calcium (limited quantities compared to need) etc.

Possible, but cause coloring of the fortified kernels: Riboflavin (B2), Vitamin C, beta-carotene
Growing Market for Fortified Rice

Global milled rice in million Mton (2015)

- Milled rice non-food
- Milled rice food non-fortified
- Fortified rice (1%)
- Dusting (mainly in US)
- Fortified kernels (coated and extruded)

- In 2015 1% of milled rice for human consumption was fortified with essential vitamin and minerals: 3,600,000 ton
Commercial Fortified Rice: some Examples
3 Key Trends Supporting Rice Fortification
The staple food of more than half of the world’s population

1. Impact of Nutrition - growing number of countries mandating rice fortification or introducing fortified rice in social safety net programs; supported by UN, governments, and NGOs to improve public health

2. Market growth & higher profitability branded specialty rice products

3. Growing health concerns connected to high rice consumption, especially white rice: type 2 diabetes, low fiber intake, and low nutritional value
MANY THANKS TO ALL PARTNERS!!
**Process Flow Diagram (extrusion)**

1. **Broken rice**
2. **Micronutrients**
3. **2 step- mixing**
4. **Preconditioning**
   - Temp. at 70-80°C
5. **Extrusion**
   - 90-110°C, 30 sec
6. **Drying**
7. **Cooling, 23°C**
8. **Packaging**
Value Chain of Rice Fortification: FRK manufacturers

**PROCESSOR RESPONSIBILITIES**

- Food safety and quality system in place
  - GMPs
  - HACCP plan
  - Traceability
  - Ability to recall

- Evidence of the reproducibility of the fortification process
  - Certificate of Analysis
  - Validation information
Value Chain of Rice Fortification: FRK manufacturers

REGULATOR RESPONSIBILITIES

- Capacities to foster compliance and monitoring
  - Infrastructure
  - Accredited laboratories
  - Validated methods
- Regulations
- Financial
- Human resources
Value Chain of Rice Fortification: BLENDERS

PROCESSOR RESPONSIBILITIES

• QA/QC plan in place
  • Basic GMPs
  • Basic Traceability
  • Good storage practices

• Evidence of the reproducibility of the fortification process
• Blending variation controls

Blending of FK with normal rice
Adequate dosage (1% + 15%)
Nutrient degradation

Sales or distribution of fortified rice
Nutrient degradation

RETAIL

FORTIFIED RICE BLENDER/MILLER
Value Chain of Rice Fortification: BLENDEERS

REGULATOR RESPONSIBILITIES
- Capacities to foster compliance and monitoring
  - Infrastructure
  - Financial
  - Human resources
- Ability to inform consumers
  - Labeling
  - Public communication
- Cross-agency dialog

Blending of FK with normal rice

Sales or distribution of fortified rice

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Adequate dosage
Nutrient degradation

FORTIFIED RICE
BLENDER/MILLER