COST AND FINANCING

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Addressing Micronutrient Deficiencies:
a Smart Investment

Top Investment Priorities

#1 Best investment

Bundled micronutrient intervention to fight hunger & improve education

Malaria combination treatment
Childhood immunization
Deworming
Tuberculosis treatment
R&D to increase yield enhancements

“One of the most compelling investments – to get nutrients to the world’s undernourished”

Vernon Smith, Nobel Laureate economist

Investment in Nutrition:

E.g. Iron fortification of flour
Cost 0.1 – 0.12 USD/pers/year
Cost Benefit Ratio: 8,7
Lessons learned from Salt, Wheat – Iodine, Iron fortification

General:
• Legislation
• Industry consolidation
• Partnership and Leadership
• Evidence based standards
• Regulation, regulatory system and regulatory monitoring
• Communication

Cost related:
• **Financial sustainability** is an issue which needs to be solved, especially to allow smaller producers to remain viable.
  
  *Increased industry consolidation improves impact, reduces costs.*

Financial sustainability needs consideration: initial expenditures are required (setting up monitoring systems where they do not exist; purchasing feeders for mills; social marketing campaigns), as well as covering recurrent costs.

• **Cost for communication** (Mandatory, Voluntary)

• **Essential to allocate sufficient resources to Regulatory system** (Mandatory)
Cost and Funding of fortified rice – Main sources of information

Fortified rice experience in 15 countries worldwide (5 in Asia)
  Most small scale, Limited duration
  Cost elements not always available

Research/Articles

Assessments

Trials, implementation
  WFP (Bangladesh, Cambodia, India)
  PATH

Private sector
  DSM, Wenger, Wright, Usher
Rice Fortification Program – Costs

Introduction phase
- Local evidence on acceptability
- Health needs assessment
- Logistical feasibility
- Value chain analysis
- Policy development
- Project management

Core cost components of rice fortification
1: Production of fortified kernels (FK)
2: Transport of FK to point of blending
3: Blending of FK with normal rice
4: Sales or distribution of fortified rice
5: Quality control and assurance (QA & QC)
6: Additional planning

Scale-up phase
- Greater efficiency in supply chain
- Social marketing; advocacy
- Economies of scale
- Commercialization

3 different cost bearers
Relative importance of cost components - Supply Chain & Delivery option
<table>
<thead>
<tr>
<th>Type – Once</th>
<th>Est. cost</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health/Nutrition Needs assessment*</td>
<td>High / Low</td>
<td>MICS, DHS, Food intake, etc.</td>
</tr>
<tr>
<td>Acceptability testing</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Kernel production Technology Development/Choice*</td>
<td>Low</td>
<td>Public- private partnership</td>
</tr>
<tr>
<td>Logistical Feasibility testing</td>
<td>Low</td>
<td>e.g. blending trials</td>
</tr>
<tr>
<td>Supply Chain/Landscape Analysis</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Cost-Benefit Analysis*</td>
<td>Low</td>
<td>As part of advocacy strategy</td>
</tr>
</tbody>
</table>

*: optional
## Initial/Start Phase  
(excl. cost of FK/FR production)

<table>
<thead>
<tr>
<th>Type - To be Continued</th>
<th>Est. cost</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partnership &amp; Coordination setup</td>
<td>Low</td>
<td>To be continued during implementation</td>
</tr>
<tr>
<td>Legislation/Policy development, incl. standard setting</td>
<td>Low</td>
<td>To be continued during implementation</td>
</tr>
<tr>
<td>Setting up of Quality Control System</td>
<td>Mod. / Low</td>
<td>Specific resources to be allocated</td>
</tr>
</tbody>
</table>

Different components, rather low cost/component  
Opportunity for cost sharing partnerships
Fortified Rice Supply Chain

Applies to coating and extrusion

- Paddy rice
- Rice farmers
  - Broken rice / head rice*
  - Fortified kernel producers
    - Fortificant / Fortificant mix (premix)
    - Micronutrient producers & suppliers
- Rice millers
- Milled rice
- Fortified rice
- Distribution and sales channels
- Social distribution channels
- Consumers

* For extrusion technology broken rice can be used to produce fortified kernels, with coating technology head rice is required
Initial and Recurrent Core Cost Components of Production of FK and FR

1: Production of fortified kernels (FK)
- Final product
- Establishing production facilities

2: Transport of FK to point of blending
- (international) transport
- Customs clearance / importation
- Local transport

3: Blending of FK with normal rice
- Establishing equipment
- Operating costs (incl. labor)

4: Sales or distribution of fortified rice
- Awareness / (social) marketing
- Monitoring & Evaluation

5: Quality control and assurance (QA & QC)

6: Additional planning

COST (FK)

COST (FR)

After production

COST (FR) consumer
### Production of FK: Capital investment made by private sector (partly/entirely recovered from consumer or govt/SSN implementer)

<table>
<thead>
<tr>
<th>Type</th>
<th>Type of equipment needed</th>
<th>Annual production</th>
<th>How Much?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hot extrusion</strong></td>
<td>Rice flour production, extruders, conveyers/driers</td>
<td>Over 1500MT</td>
<td>1,2 – 1,8 milliom</td>
</tr>
<tr>
<td><strong>Warm extrusion</strong></td>
<td>?</td>
<td>?</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Cold extrusion</strong></td>
<td>730 MT</td>
<td>750.000 USD</td>
<td></td>
</tr>
<tr>
<td><strong>Coating</strong></td>
<td>Drums, sprayers</td>
<td>430 MT</td>
<td>350.000 USD</td>
</tr>
<tr>
<td><strong>Building Space</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>QC Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Production of FK: Typical Core/Recurrent Costs paid by Private sector (entirely or partly recovered from consumer or Govt SS implementer)

<table>
<thead>
<tr>
<th>Type</th>
<th>Relative Contribution to Cost</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement and storage of vitamins and minerals</td>
<td>Limited influence – approx. only 30%</td>
<td>Cost effective to include multiple MN Trade off between higher levels of MN and lower blending ratio</td>
</tr>
<tr>
<td>Broken/Head rice*</td>
<td>Important cost factor</td>
<td>Higher in case of coating</td>
</tr>
<tr>
<td>Operating costs (staff, electricity, etc.)</td>
<td>Important cost factor</td>
<td>Drying costs contribute significantly (energy)</td>
</tr>
<tr>
<td>Internal Quality Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repayment of loans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: broken rice is required for extrusion technology, head rice for coating technology
Production of Fortified Kernel – General

2 Supply chains need to be established: fortificant premix - rice

Capacity utilization is key

Availability FK at scale can become a problem
CAREFUL PLANING NEEDED

Costs at FK production difficult to establish – depends on availability of preexisting equipment, the choice of fortification technology, and supply chain limits and enabling environment
Transport Fortified Kernels to Blending Point

- **International transport**
  - Distance
  - Mode of transport: rail, road, air, see
  - Quantity
  - Transport market price fluctuations
  - Import fees and customs clearance

- **Local transport**
  - Distance
  - Supply chain complexity
  - Quantities

Blending at point of FK production is most cost-efficient
BUT doesn’t lead necessarily to sustainable market ...
### Blending: Typical Investment and Recurrent Costs paid by Private sector, but passed on to...

<table>
<thead>
<tr>
<th>Type</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dosing/Blending equipment</strong></td>
<td><strong>Remark</strong></td>
</tr>
<tr>
<td>Continuous</td>
<td>Blender system</td>
</tr>
<tr>
<td>Batch</td>
<td>Kernel feeder &amp; scale</td>
</tr>
<tr>
<td><strong>Batch</strong></td>
<td>Mixer &amp; scale</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td><strong>Remark</strong></td>
</tr>
<tr>
<td><strong>Procurement and storage FK</strong></td>
<td><strong>Remark</strong></td>
</tr>
<tr>
<td>Important</td>
<td>Storage stability depends on MN content (Vit A and Vit B 1)</td>
</tr>
<tr>
<td>Cost of FK depends on inclusion rate –</td>
<td>Estimated at 80 – 90% of fortification costs (excl. transport, but</td>
</tr>
<tr>
<td>trade of between cost &amp;</td>
<td>incl. repayment of loans, QC, etc.)</td>
</tr>
<tr>
<td>acceptability/technological aspects</td>
<td></td>
</tr>
<tr>
<td><strong>Internal Quality Control</strong></td>
<td>Relatively simple</td>
</tr>
<tr>
<td><strong>Other operating costs (staff, electricity, etc.)</strong></td>
<td>Continuous: lower labour costs</td>
</tr>
<tr>
<td></td>
<td>Batch: higher labour costs</td>
</tr>
<tr>
<td><strong>Repayment of loans</strong></td>
<td></td>
</tr>
</tbody>
</table>
Production of Fortified Rice – General

- Inclusion rate

- Cost FK important cost component of FR

- Transport – supply chain: FK to blending site (and head/broken rice to FK production site)

- Not possible to provide one cost figure that can be applied everywhere
# Sales or Distribution of Fortified Rice

<table>
<thead>
<tr>
<th></th>
<th>Mandatory</th>
<th>Voluntary</th>
<th>Social Safety Nets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social marketing/Advertising</td>
<td>Needed</td>
<td>High</td>
<td>Needed</td>
</tr>
<tr>
<td>Transport, Storage (shelf life)</td>
<td>Costs can be reduced through improving supply chain management</td>
<td>Limited</td>
<td>Yes, if SSN is well targeted and implemented</td>
</tr>
<tr>
<td>Possible public Health impact (CBR)</td>
<td>Yes</td>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>External quality assurance and quality control (QA &amp; QC) – Regulatory environment</td>
<td>Moderate</td>
<td>Limited</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
Quality Control & Quality Assurance (Internal & External)

- Assessment and certification of fortified rice and suppliers
  - Quality of fortified kernels
  - Micronutrient mix used and levels of micronutrients

- Validation of the blending process
  - Fortification ratio
  - Homogeneous mixing

- Availability of lab facilities
  - Certification and auditing of labs

- Clear guidelines and requirements for rice fortification
  - Integrated in regulatory framework
  - Mandatory legislation
QC & QA/Regulatory system – General

- Total Quality Approach – Integrated in existing systems
  Internal - External

- Conduct at FR production sites, instead of retail

- Right balance between incentives and punitive measures

- Rather low cost, but needs ADDITIONAL ATTENTION
Additional Planning

- Impact of fortified rice on production cycle
  - Stock of fortified rice at mill; or
  - Increase production lead-time

- Expiration date
  - Fortified rice: 1 ½ - 2 year self live after blending, reducing the shelf live of rice (levels of micronutrients decrease over time)
  - Rice milling industry, wholesalers and retailers to adjust stock management practices

- Double check possible PH impact
  - Do people that can benefit most from rice fortification access the FR?

Improve supply chain – Increase market consolidation

Improve CBR - Optimise targeting for PH impact
Scale Up Phase

- Essential cost components remain but greater efficiency in the supply chain and economies of scale
  - Increased market size
  - Commercial market development
- Reduction in fortified kernels costs
  - Local production of fortified kernel - Cost of transport lowered substantially
- Legislation
  - Mandatory fortification standards
  - Clear guidelines
- Consumer awareness
  - Social marketing – Awareness raising
  - Avoid misconceptions
- Coverage
  - Increase coverage – availability of FR

Public-private partnerships important for successful scale up
<table>
<thead>
<tr>
<th>Cost Component</th>
<th>Social Safety Net</th>
<th>Mandatory</th>
<th>Voluntary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocacy</td>
<td>Donor</td>
<td>Donor</td>
<td>Donor/Government/Miller</td>
</tr>
<tr>
<td>Landscape Analysis</td>
<td>Donor/Government</td>
<td>Donor/Government</td>
<td>N/A</td>
</tr>
<tr>
<td>Prog design/planning</td>
<td>Donor/Government</td>
<td>Donor/Government</td>
<td>N/A</td>
</tr>
<tr>
<td>Production of FK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial cost of plant</td>
<td>N/A or Government</td>
<td>Private sector</td>
<td>Private sector</td>
</tr>
<tr>
<td>• Recurring Costs</td>
<td>Government</td>
<td>Miller/Consumer</td>
<td>Miller/Consumer</td>
</tr>
<tr>
<td>Transport of FK to blending point</td>
<td>Government</td>
<td>Miller/Consumer</td>
<td>Miller/Consumer</td>
</tr>
<tr>
<td>Blending</td>
<td>Government</td>
<td>Miller/Consumer</td>
<td>Miller/Consumer</td>
</tr>
<tr>
<td>Distribution</td>
<td>Blending</td>
<td>Miller/Consumer</td>
<td>Miller/Consumer</td>
</tr>
<tr>
<td>Marketing &amp; Promotion</td>
<td>N/A</td>
<td>N/A</td>
<td>Miller/Consumer/Go vernment</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>Government</td>
<td>Miller/Consumer</td>
<td>Miller/Consumer</td>
</tr>
<tr>
<td>Regulatory monitoring &amp; enforcement</td>
<td>Government</td>
<td>Government</td>
<td>Government or N/A</td>
</tr>
<tr>
<td>Impact Evaluation</td>
<td>Government</td>
<td>Government</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## Cost comparison per company, as received from company representatives present in this workshop on 17 Sept.

<table>
<thead>
<tr>
<th>Type</th>
<th>Technology</th>
<th>$/kg FK</th>
<th>Inclusion ratio</th>
<th>%/MT FR</th>
<th>Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buhler Food</td>
<td>Hot extrusion</td>
<td>2,5</td>
<td>0,5 – 1,0%</td>
<td>12 – 25</td>
<td>Price variation for VM</td>
</tr>
<tr>
<td></td>
<td>3,0</td>
<td></td>
<td>0,5 – 1,0%</td>
<td>15 - 30</td>
<td></td>
</tr>
<tr>
<td>Usher Agro</td>
<td>Warm Extrusion</td>
<td>2,0</td>
<td>1%</td>
<td>20</td>
<td>Iron only</td>
</tr>
<tr>
<td></td>
<td>2,5</td>
<td></td>
<td></td>
<td>25</td>
<td>Iron, Folic Acid</td>
</tr>
<tr>
<td></td>
<td>3,0</td>
<td></td>
<td></td>
<td>30</td>
<td>Iron, Folic Acid and Thiamin</td>
</tr>
<tr>
<td>Wright</td>
<td>Coating</td>
<td>1,6</td>
<td>0,5%</td>
<td>8</td>
<td>Iron only</td>
</tr>
<tr>
<td></td>
<td>2,0</td>
<td></td>
<td>0,5%</td>
<td>10</td>
<td>‘fully loaded’</td>
</tr>
<tr>
<td></td>
<td>2,5</td>
<td></td>
<td>0,25%</td>
<td>6,25</td>
<td>Costa Rica</td>
</tr>
<tr>
<td>Wenger</td>
<td>Hot Ext.</td>
<td>Available upon request</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Price of FR (FK) depends on what customer/country needs:
- MN content
- SCALE
Closing remarks

• Different context specific factors define cost (FK, FR after production, consumer)
  • Supply chain (transport) – level of industry consolidation
  • Price of rice, electricity,...
  • Delivery option
  • Scale

⇒ Not possible to give a general cost figure
⇒ Costing exercise is needed for each specific context
⇒ More cost analysis will allow to better understand cost components and relative importance
Thank you
Terima kasih
Salamat Po