PREMIX for FORTIFICATION

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Premix: General Requirements

• Bio-availability of micronutrients
• No change of organoleptic features
• Affordable cost
• Acceptable colour, solubility and particle size
• Commercially available ingredients
• No interaction of active ingredients
• Safety
Premix considerations

• Definition
• Choice of Fortificant
• Formulation
Fortificant choice depends upon:

- Identification and Prevalence of Deficiencies
- Consumption pattern of target food
- Single or multiple fortificant
- Bio-availability of micronutrients
- Distribution and storage conditions
- Affordability
Micronutrients for flour - Minerals

• Minerals – (WHO Recommendations)
  • Iron; Ferrous Sulphate, Ferrous Fumarate, NaFeEDTA, Electrolytic
  • Zinc; Zinc Oxide

• Minerals - Others
  • Calcium; Calcium Carbonate or Calcium Sulphate
  • Magnesium; Magnesium Sulphate
  • Phosphorus; Calcium Phosphate
  • Selenium; Sodium Selenite
Micronutrients for Flours – Vitamins

• Vitamins
  • Vitamin A (WHO guideline)
  • Folic Acid (WHO guideline)
  • Vitamin B1, B2, B3, B5, B6, B12
  • Vitamin D
  • **NOTE:** Vitamin C should not be used as a fortificant it reacts with cereal proteins and is destroyed
Wheat Premix: To meet US/Canada regulations

- **Used in North American mills**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount per kg Flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiamine B1</td>
<td>5.2 mg</td>
</tr>
<tr>
<td>Riboflavin B2</td>
<td>3.6 mg</td>
</tr>
<tr>
<td>Niacin B3</td>
<td>42 mg</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>1.5 mg</td>
</tr>
<tr>
<td>Iron, electrolytic</td>
<td>35 mg</td>
</tr>
</tbody>
</table>

- **Dosage 160 g per MT flour**
Premixes and Standards
North American Example

• Standards in US and Canada set based on Addition and natural levels

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Added</th>
<th>Natural</th>
<th>Total</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>5.2</td>
<td>1.3</td>
<td>6.5</td>
<td>6.3</td>
</tr>
<tr>
<td>B2</td>
<td>4.0</td>
<td>0.4</td>
<td>4.4</td>
<td>4.0</td>
</tr>
<tr>
<td>B3</td>
<td>46</td>
<td>12</td>
<td>58</td>
<td>52</td>
</tr>
<tr>
<td>FA</td>
<td>1.5</td>
<td>0.2</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Iron</td>
<td>38</td>
<td>11</td>
<td>49</td>
<td>44</td>
</tr>
</tbody>
</table>
Process Losses - Cooking

• Standards for processed foods made from fortified maize must reflect processing losses
• Main source of losses for maize are during cooking at the household level
• Premixes should contain overages of minerals and vitamins to compensate for processing variations.
Frequency of procurement

• Depends upon shelf life of premix, usage rate by millers and flour demand

• Premix delivery lead times are about 3-4 months depending upon origin

• Premix shelf life is usually 9 to 18 months depending upon composition – Kosovo premix is simple and will have 12-15 months shelf life

• Sufficient stocks must be in country at mill level to ensure continuation of fortification
Procurement of Premix – Who is responsible?

• If there is mandatory fortification and flour prices can be adjusted, then millers are responsible for procurement just as they are for buying wheat.

• Key is long term sustainability – cannot rely on outside sources of funding for premix

• Options in practice today in other countries: Millers, Millers association, MoH.
Sources of Premix:

• International Suppliers Europe: CSM, DSM, Eurogerm, Fortitech, Muhlenchemie,

• International Suppliers Americas: Corbion, Granotec, Research Products

• International Suppliers Asia: Hexagon, Nicolas Piramal

• GAIN premix facility suppliers [www.gpf.gainhealth.org](http://www.gpf.gainhealth.org)

NOTE: Smarter Futures and FFI provide a list of suppliers only. Millers and stakeholders must follow internationally accepted procurement procedures.