



Ferric Sodium EDTA (Ferrazone®)

for effective flour fortification with iron

Arusha, Tanzania
November 17, 2008

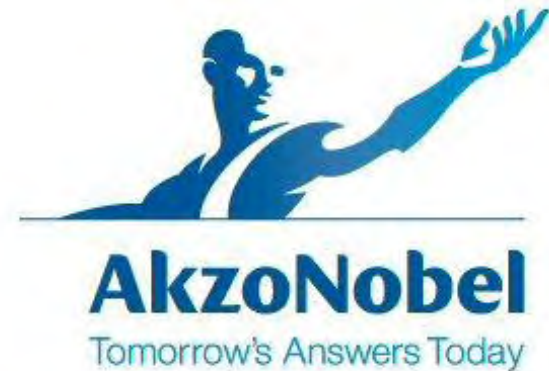
Dr. Carel Wreesmann

Akzo Nobel Functional Chemicals
carel.wreesmann@akzonobel.com
+31 6 22 49 69 20

Akzo Nobel: Key Figures

Net sales € 14 bln / year
Number of employees approx. 60,000

Decorative Paints
Specialty Chemicals
Performance Coatings



Ferrazone ® => Specialty Chemicals
Business Unit Functional Chemicals

Iron Absorption and Requirement

Absorption only to compensate for losses
desquamation (skin cells), menstruation, ...

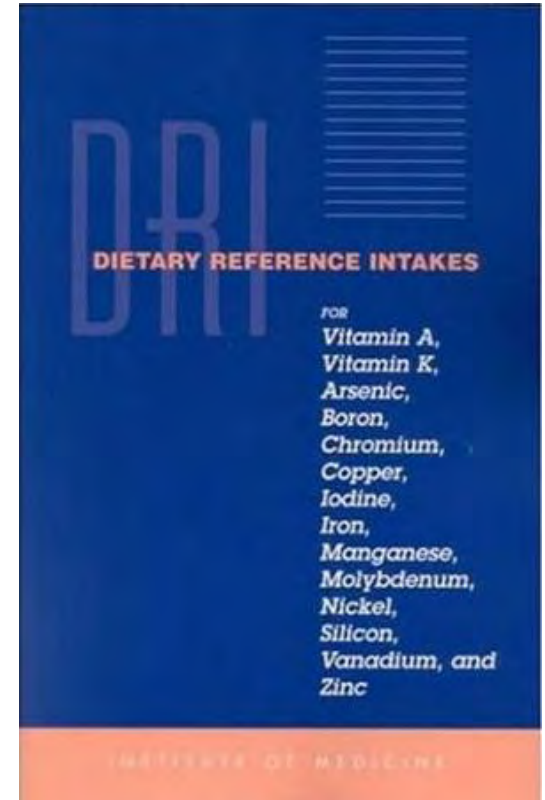
Body iron requirements (in mg/d)

| | |
|--------------------------------|--------------|
| adult men | 1 – 1½ |
| adult women | 1 – 3 |
| <i>pregnant women</i> | ~ 4 |
| <i>Infants (6 – 12 months)</i> | ~ 1 |

Absorption Fe: maximum 10 – 20% !

When less is absorbed over several years
(e.g. 0.5 rather than 1.0 mg/d)

➔ **iron deficiency anemia**



US IoM 2001

What can be done?

Dietary changes

meat, vitamin C

long-term option, expensive

Supplementation

tablets, syrups (medicines)

only small part of a population

Fortification

staple foods

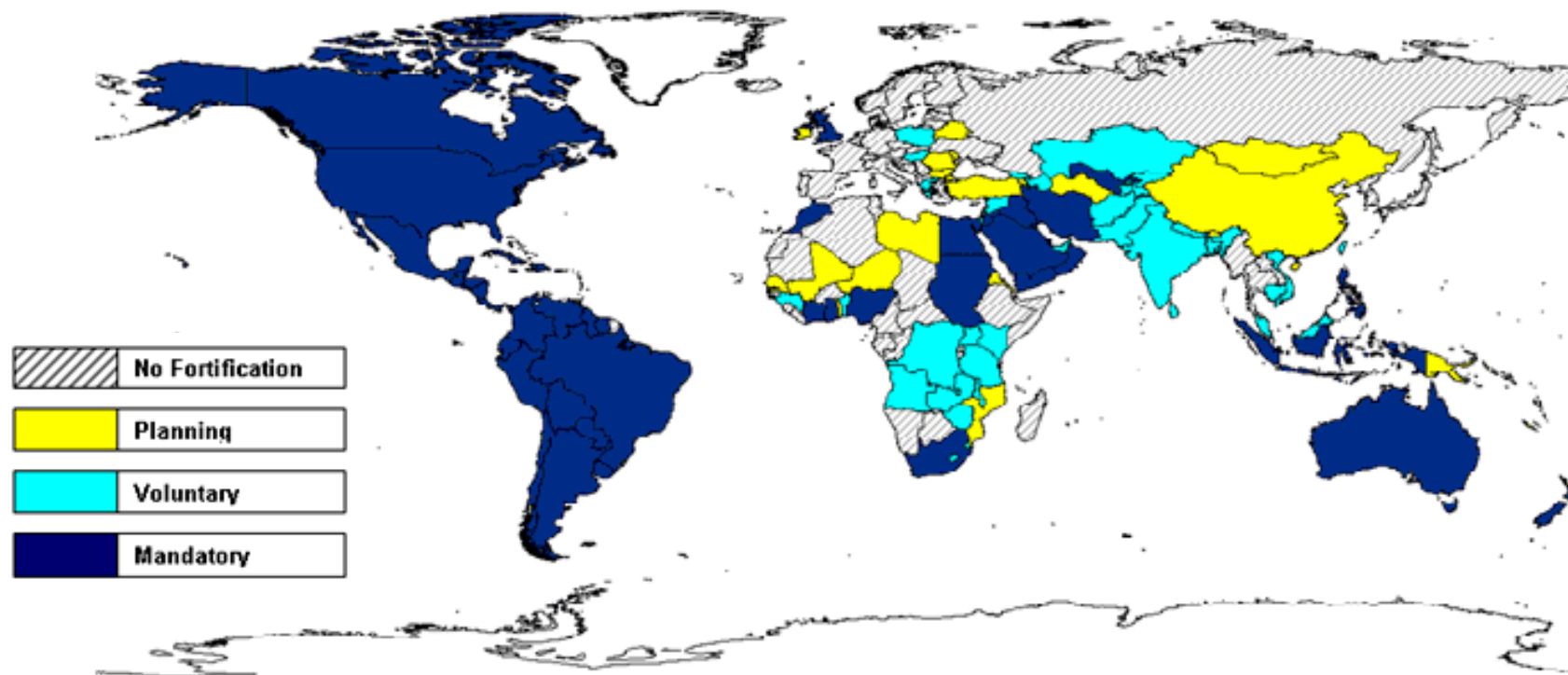
beverages, snacks

whole population

target groups

National Wheat Flour Fortification Programs

Fortification Status - September 2008



...about 2/3 of the countries in the world run wheat flour fortification programs...

Source: Flour Fortification Initiative (FFI) at

<http://www.sph.emory.edu/wheatflour/globalmap.php>

Why not Effective?

Level of iron is sufficient but absorption is too low

Type of iron fortificant is critically important

- bio-availability (absorption)
- rancidity upon storage

electrolytic iron (electrolytic, reduced, ...)

ferrous sulfate (FeSO_4)

ferric sodium EDTA (FeNa-EDTA; Ferrazone®)

School Feeding Trial in Kenya 2004

2004: fortified maize porridge (5 months)

Wageningen University (NL) KEMRI Nairobi (Kenya)
Unilever R&D Vlaardingen (NL) Akzo Nobel Arnhem (NL)

Ferrazone + vitamins in 4 groups:

Fe as Ferrazone: 3 – 4 mg/d and 6 – 8 mg/d
Fe as electrolytic iron: 6 – 8 mg/d and control

Electrolytic iron

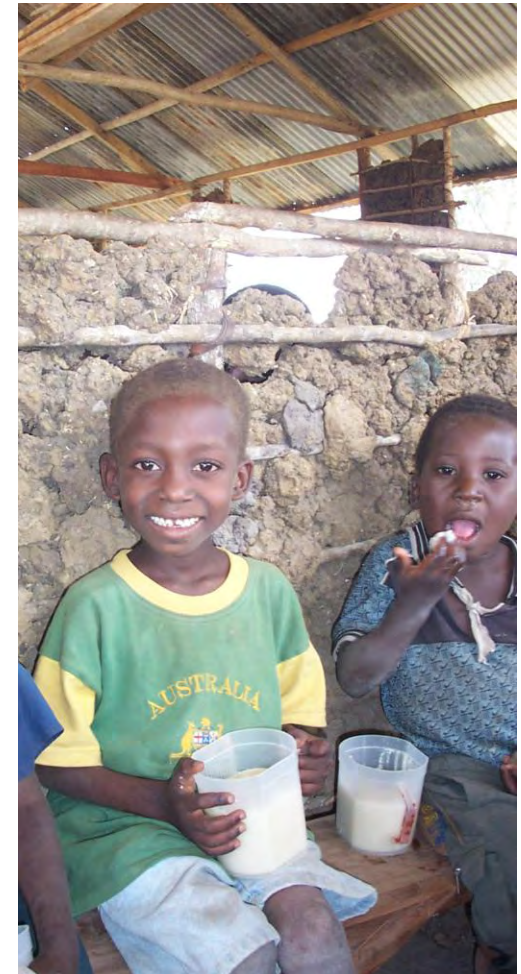
no change with control group

Ferrazone

significant reduction of IDA

low dose: 50% ... high dose: up to 90%

Andang'o et al. in The Lancet **369** (2007) 1799
IDA= iron deficiency anemia



WHO / FAO 2006

Summary: iron fortification (page 111)

- *NaFeEDTA is recommended for the mass fortification of high-phytate cereal flours and for sauces with a high peptide content (e.g. fish sauce, soy sauce).*



Guidelines on food fortification with micronutrients

Edited by Lindsay Allen, Bruno de Benoist,
Omar Dary and Richard Hurrell



Food and Agricultural Organization
of the United Nations

Regulatory Status FeNa-EDTA



JECFA (2007)

Sodium iron EDTA is suitable for use as a source of iron for food fortification to fulfill nutritional iron requirements ...

US FDA

GRAS notices GRN 152 and GRN 178

EU EFSA

Dossier submitted, final statement pending

India

Approved for atta flour and drinks by PFA

Approval also in Brazil, China, Mexico, Pakistan, Philippines, Vietnam, ...

→ No formal approval yet in many African countries

Current Applications

China: soy sauce, wheat flour

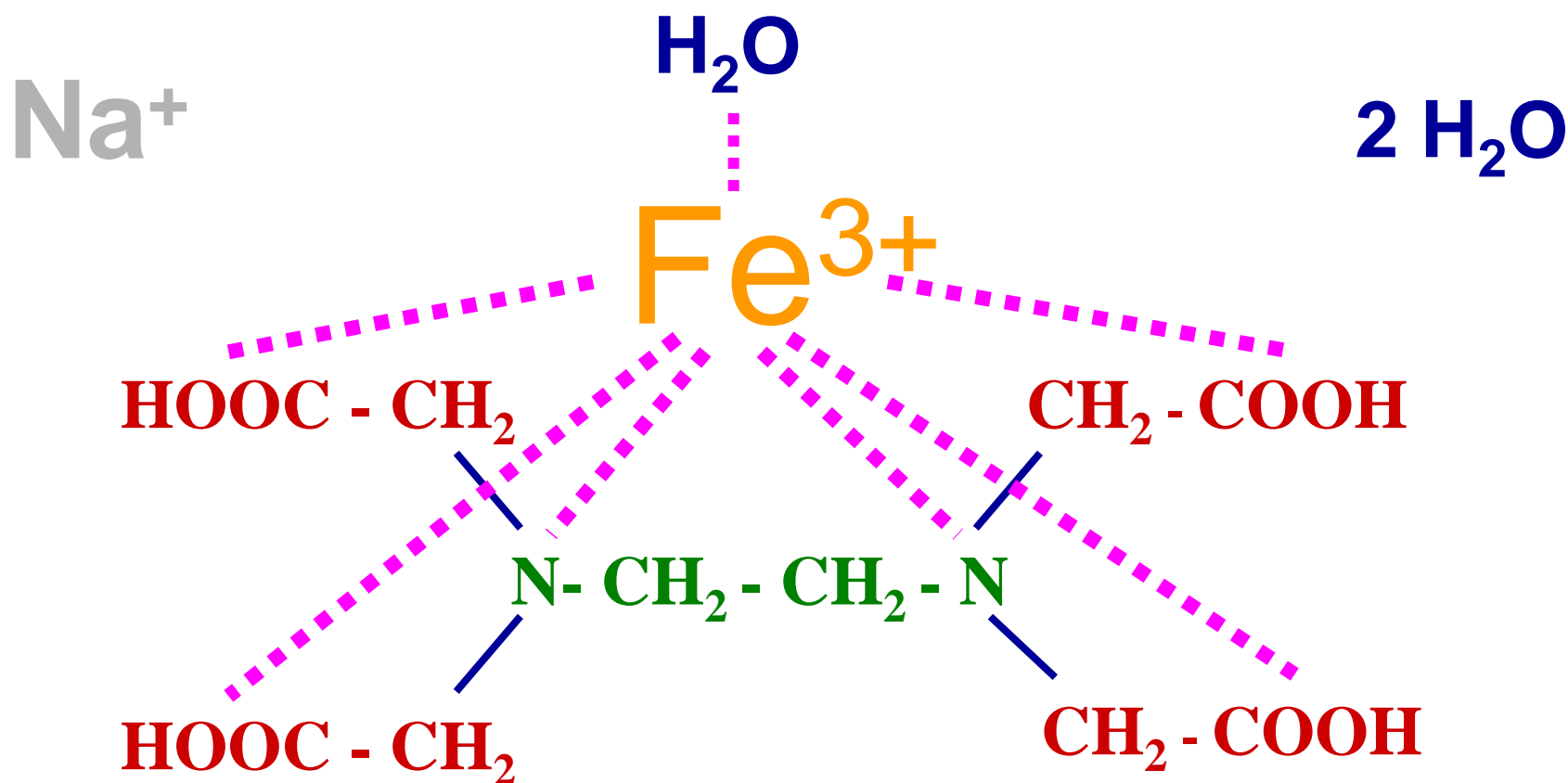
Vietnam: fish sauce

Pakistan, India: atta flour



Brazil, Mexico, Philippines,
Morocco, South Africa, ...:
powdered beverage (Tang)

Ferric Sodium EDTA



Ferrazone® XF



Food-grade ferric sodium EDTA ex AkzoNobel

➔ **Ferrazone®**

www.ferrazone.com

Wheat flour: particle size < 150 micron
special “extra fine” grade

➔ **Ferrazone® XF**

Ferrazone® XF
Sodium Iron (III) Ethylenediaminetetraacetate

Ferrazone® XF is a stable, water soluble iron compound that meets JECFA specifications for food fortification. Ferrazone® XF is Generally Recognized As Safe (GRAS) by the US FDA. Ferrazone® XF manufacturing is certified to be in accordance with the HACCP requirements.

| Checkpoint | Specification | Units | Method |
|---------------------------------|------------------------------|-------|--------|
| Appearance | Light yellow coloured powder | | visual |
| Iron content | 12.5-13.5 | % | JECFA |
| EDTA content | 65.5-70.5 | % | JECFA |
| Identification | Passes tests | | JECFA |
| pH of a 1% w/v aqueous solution | 3.5-5.5 | | JECFA |
| Water-insoluble matter | 0.1 max | % | JECFA |
| Nitritriacetic acid | < 0.1 | % | JECFA |
| Arsenic | 1 max. | mg/kg | JECFA |
| Lead | 1 max. | mg/kg | JECFA |

Net Weight: 25 kg

LOT CODE

Produced in the Netherlands
Akzo Nobel Functional Chemicals b.v.
According to ISO 9002 & ISO 14001
Keep out of direct sunlight
Emergency Telephone
Tel: + 31 570 679211 Fax: + 31 570 679801

Thank you for your attention