

GOING FORWARD WITH FLOUR FORTIFICATION IN AFRICA

Filip Van Bockstaele, 28-10-2016, 27th International Conference on Spina Bifida and Hydrocephalus

BASICS OF FORTIFICATION

RATIONALE

- Vitamins and minerals = **micro-nutrients**
 - Low presence in foods
 - Play an essential role in biochemical reactions in human body
- Deficiencies in micronutrients
 - Often related to malnutrition
 - Cause diseases, birth defects, reduced immunity, reduced growth and cognitive development



RATIONALE

– Levels of deficiencies around the world

Country	Neural tube defects per 10,000 births	% Anemia in non-pregnant women of reproductive age	% Anemia in pre-school children	% Population at risk of inadequate zinc intake
Afghanistan	20	31	44	20.2
Belgium	9	18	13	6.8
Uganda	13	26	56	20.5
Zimbabwe	23	28	59	48.4
South-Africa	23	27	41	20.0
USA	4.6	12	6	5.0
Tanzania	13	38	61	34.1
DR Congo	20	49	67	54.3
Brazil	38	19	24	7.3



COPENHAGEN CONSENSUS

	Solution	Challenge
1	Micronutrient supplements for children (A & Zn)	Malnutrition
2	The Doha development agenda	Trade
3	Micronutrient fortification	Malnutrition
4	Expanded immunization coverage for children	Diseases
5	Biofortification	Malnutrition
6	Deworming, other nutrition programs in school	Malnutrition
7	Lowering the price of schooling	Education
8	Increase and improve girl's schooling	Women
9	Community-based nutrition programs	Malnutrition

Nobel Prizewinning Economists: Finn Kydland, Robert Mundell, Douglass North, Thomas Schelling, Vernon L. Smith



FOOD FORTIFICATION

Food fortification has been defined as the **addition** of **one or more** essential nutrients to a food, whether or not it is normally contained in the food, for the **purpose** of preventing or correcting a demonstrated deficiency of one or more nutrients in the **population** or specific population groups (FAO/WHO 1994).



WHY FOOD FORTIFICATION?

- It works!
 - eg. NTD's prevalence reduced with 40% upon folic acid fortification in Chile
- Cost efficient:



Llanos, A., et. al., Cost-effectiveness of a Folic Acid Fortification Program in Chile. *Health Policy* 83 2007:295-303.
Sayed, A., et.al., Decline in the Prevalence of Neural Tube Defects Following Folic Acid Fortification and Its Cost-Benefit in South Africa. *Birth Defects Research* 82 2008:211-216.
Grosse, Scott, et. al., Reevaluating the Benefits of Folic Acid Fortification in the United States: Economic Analysis, Regulation, and Public Health. *American Journal of Public Health* 95 2005:1917-1922.

FOOD FORTIFICATION VEHICLES

OIL



Vitamin A,E

MILK



Vit A,D
Ca

CEREALS



Fe, Zn
Vit. B1, B2, B3, B6
Folic acid
Vitamin A

SALT



Iodine

SUGAR



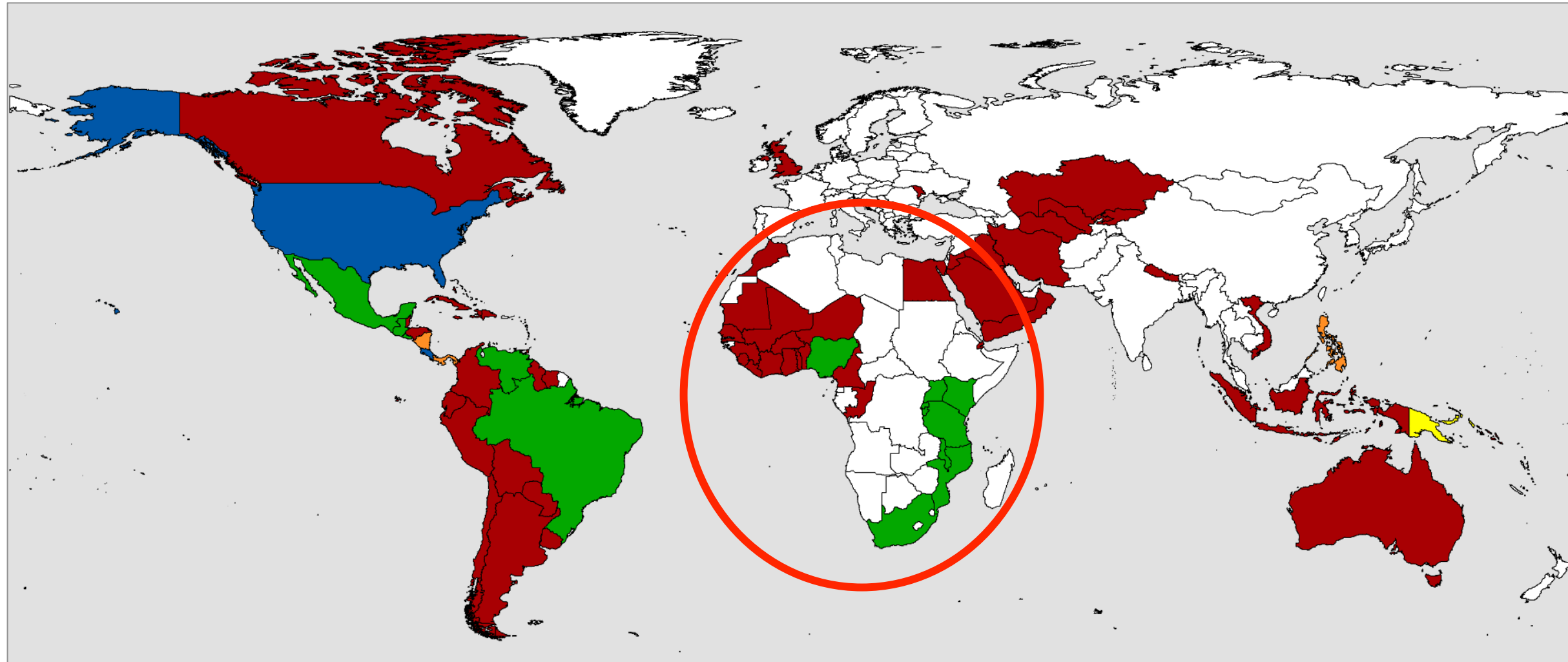
Vitamin A

WHY ARE CEREALS A GOOD VEHICLE?

- Staple food
 - Carbohydrate source
 - Daily consumed
 - High consumption levels
- Cereal processing industry
 - Well established world-wide
 - Large scale operations



GRAIN FORTIFICATION WORLDWIDE



	Wheat flour – 66 countries
	Rice – 1 country (Papua New Guinea)
	Wheat flour and maize flour –14 countries

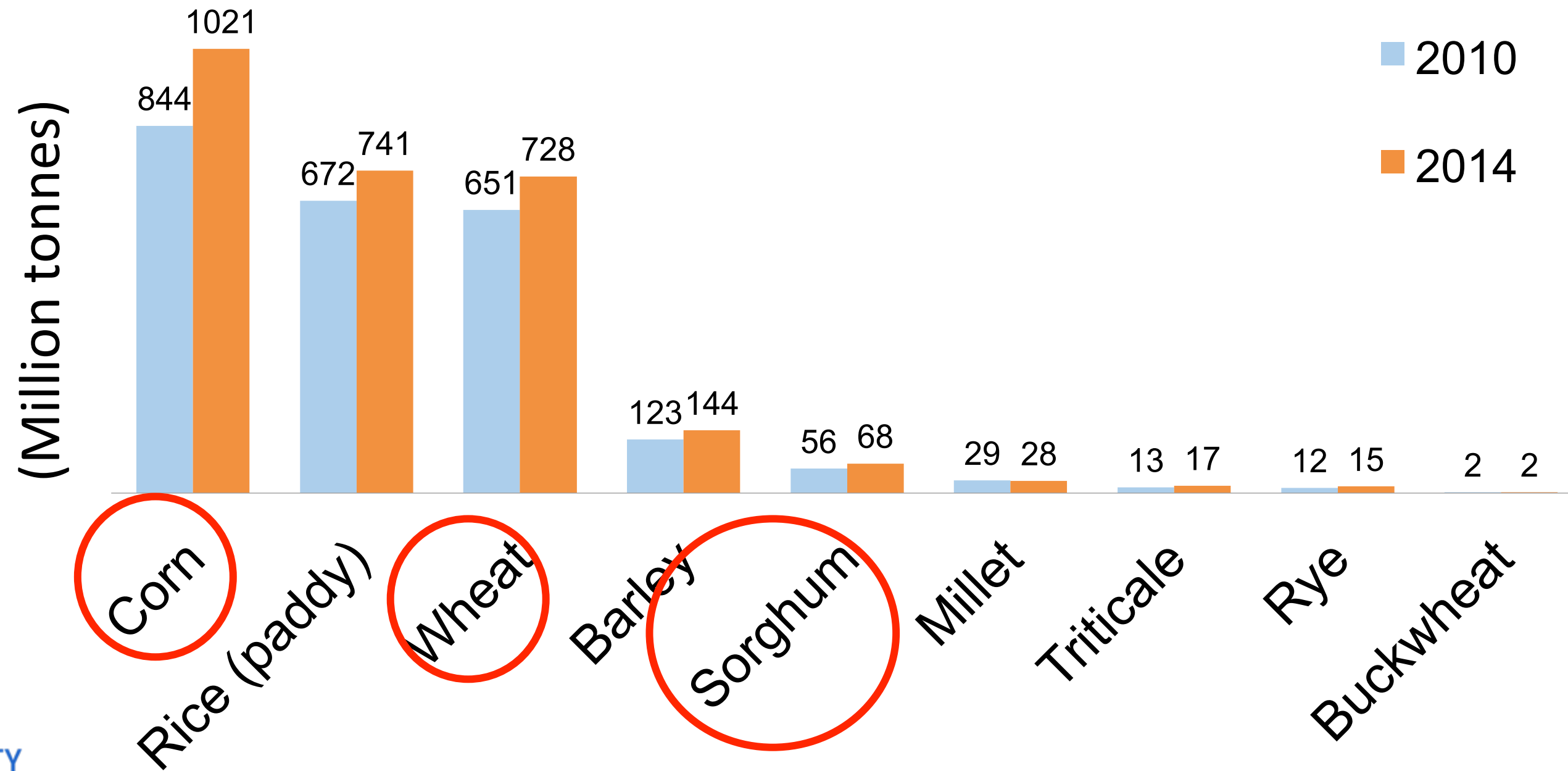
	Wheat flour and rice – 3 countries (Nicaragua, Panama, Philippines)
	Wheat flour, maize flour, and rice – 2 countries (Costa Rica and the United States)
	No grain fortification legislation



CEREALS IN THE WORLD

– Annual production of major cereals in 2010/2014

(source: faostat.fao.org)



HOW ARE CEREALS FORTIFIED?

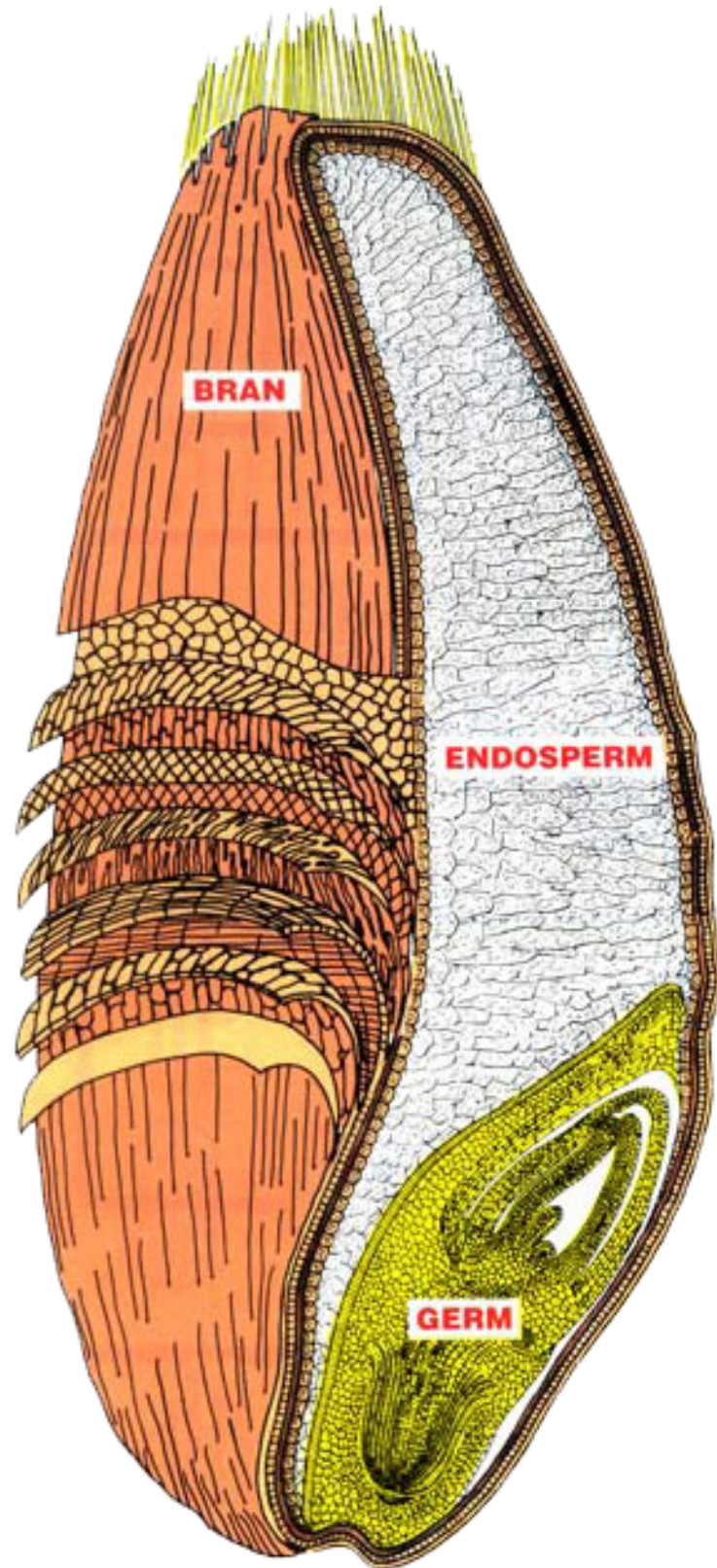
- Cereals processing
 - Milling and sieving
 - End products: white flour or meal, bran, germ
 - Intermediate products -> food products
 - Wheat flour -> bread
 - Maize meal -> porridge

Fortification is performed at the level of the flour/meal



HOW ARE CEREALS FORTIFIED?

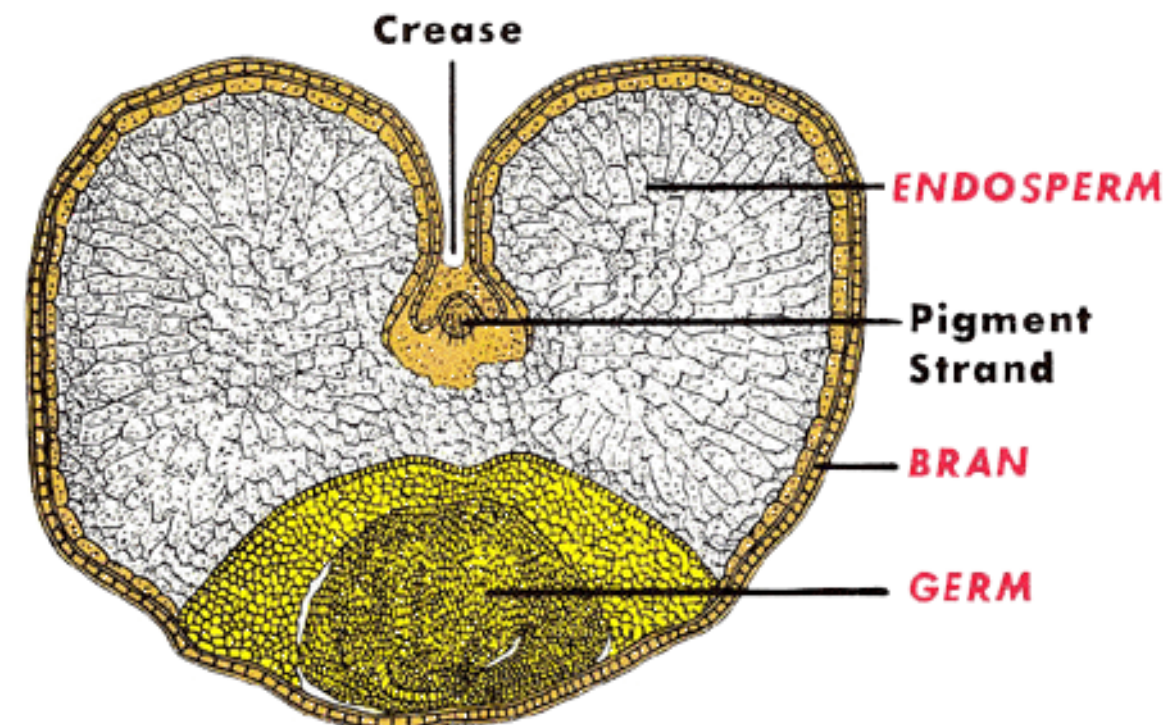
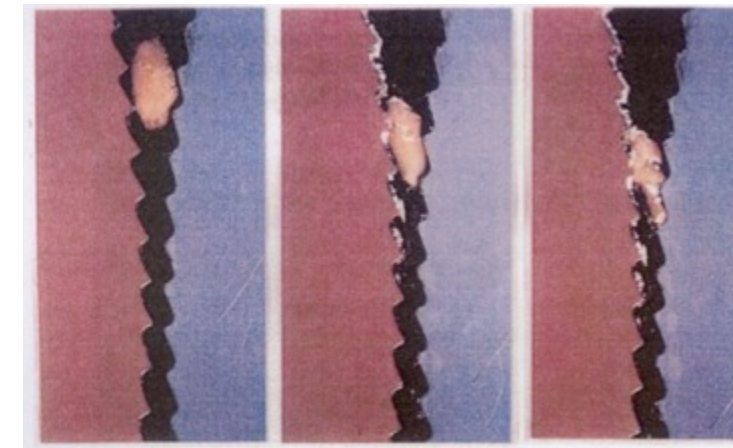
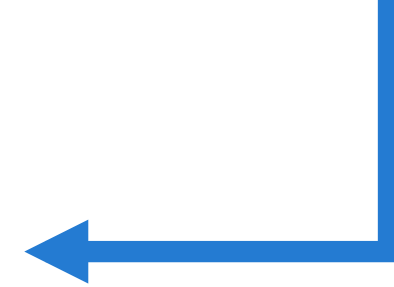
– Wheat



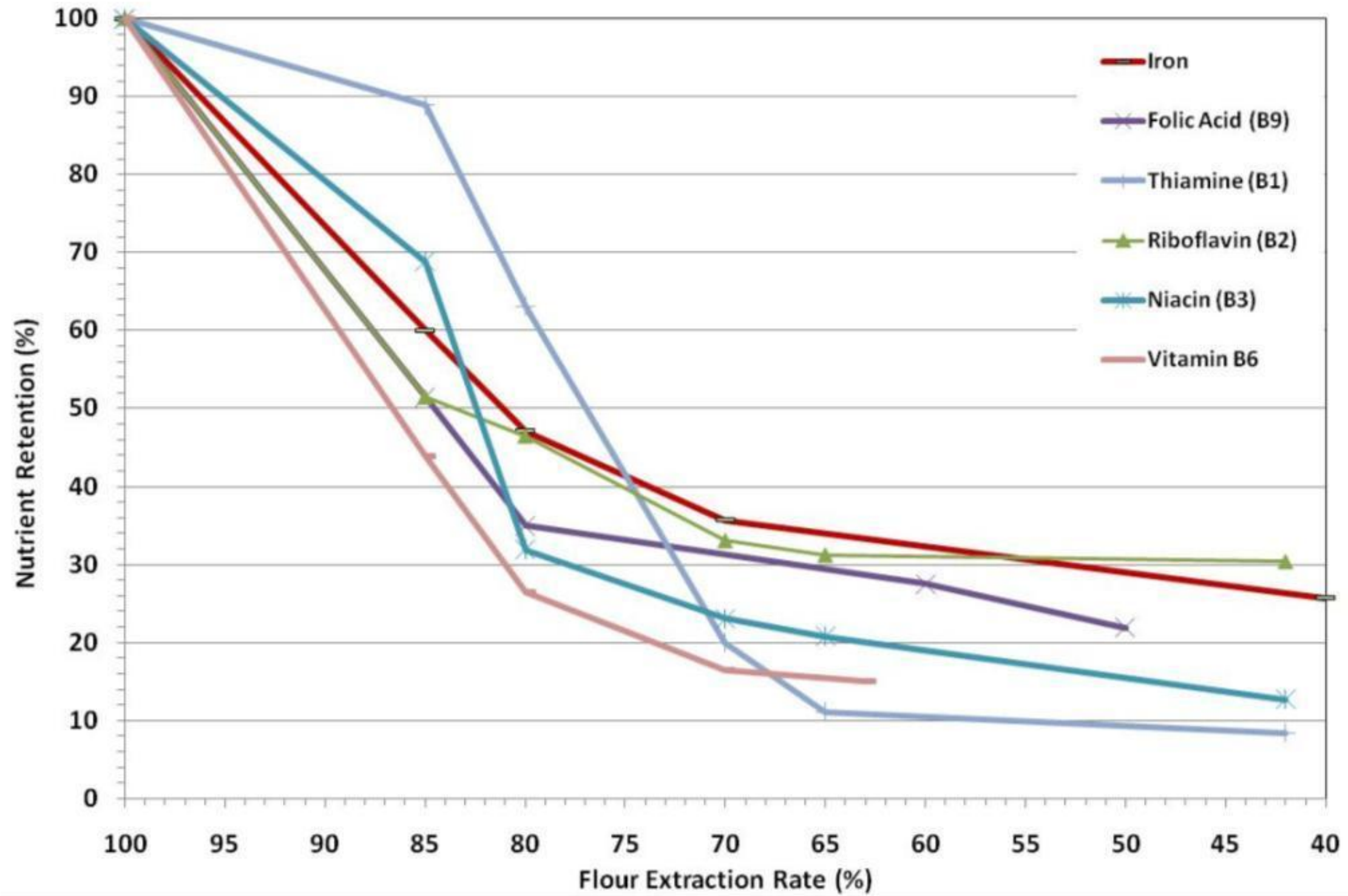
Bran



Fine white flour

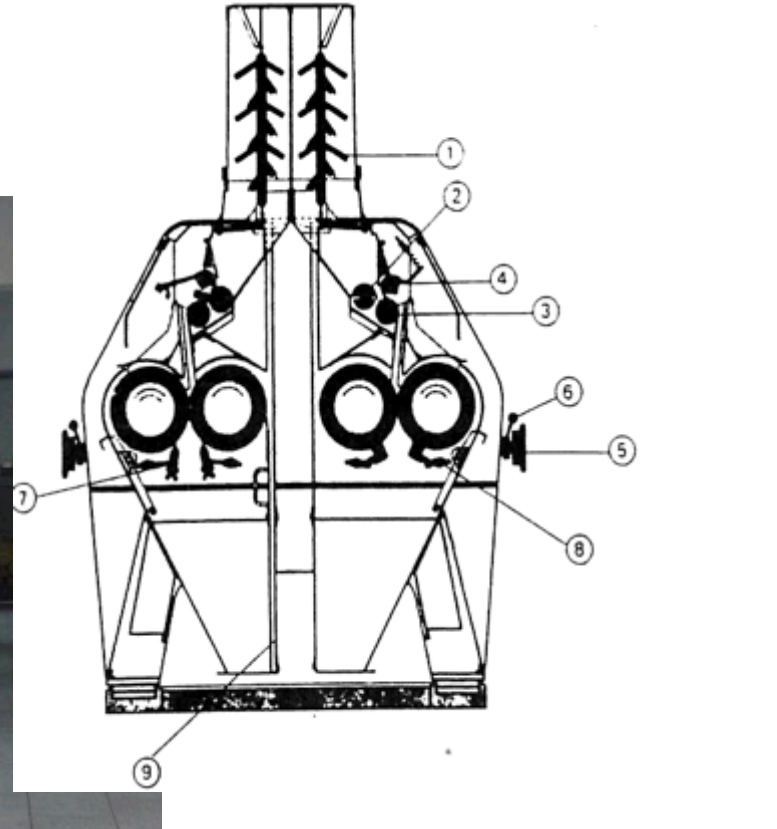


CEREAL PROCESSING



HOW ARE CEREALS FORTIFIED?

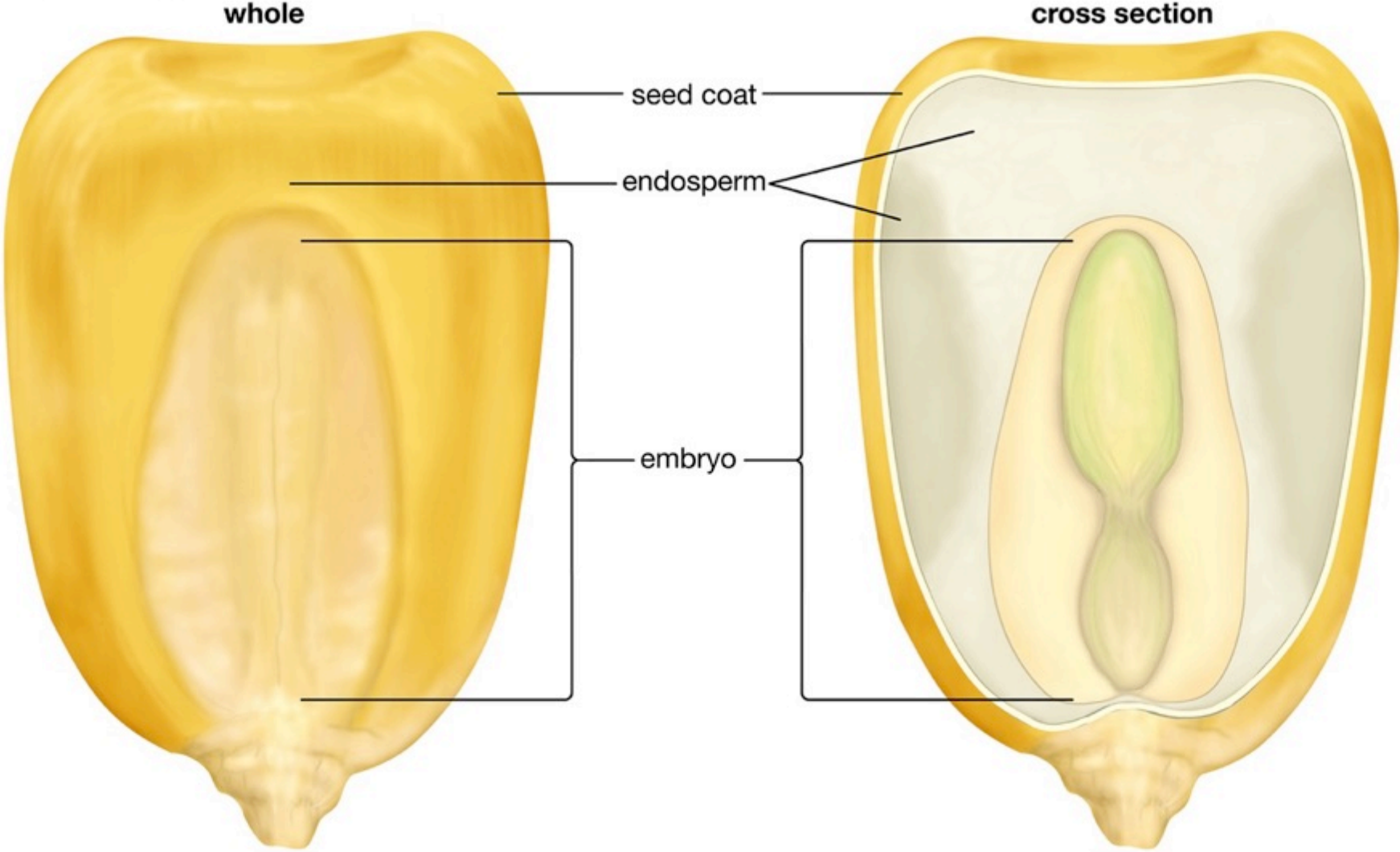
– Wheat mill



HOW ARE CEREALS FORTIFIED?

– Maize/corn

Corn kernel

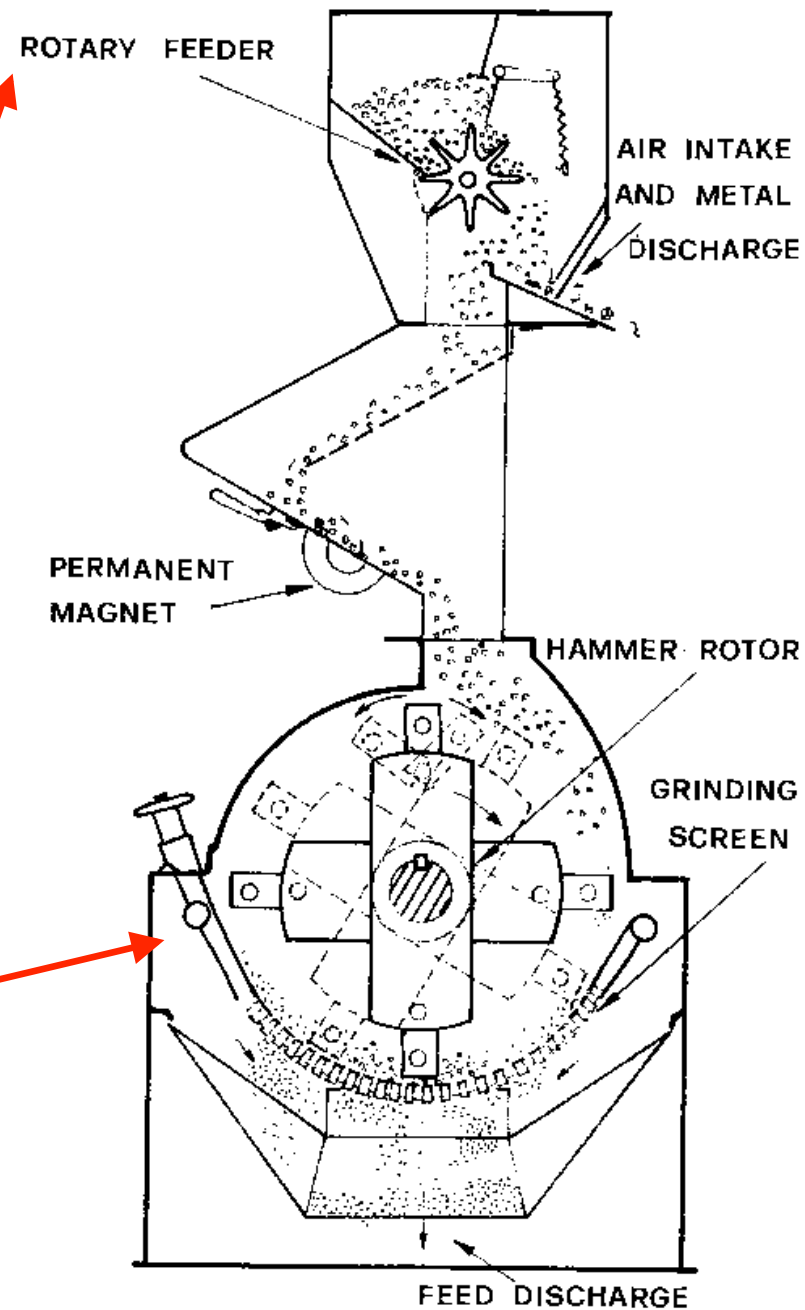


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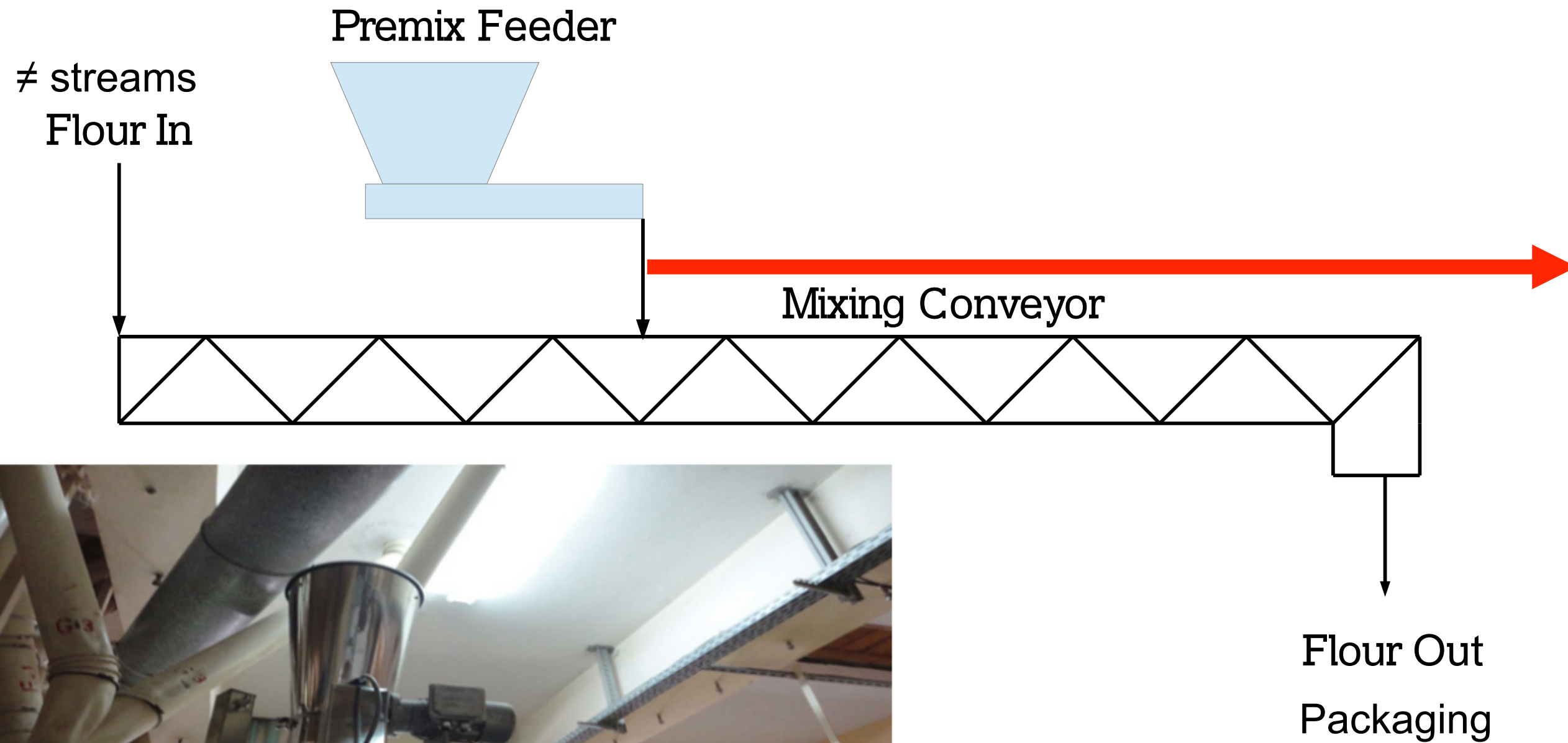
HOW ARE CEREALS FORTIFIED?

- Roller mills (big): cfr wheat, multistep size reduction+sieving
- Hammer mills (small): 1 step size-reduction of dehulled maize



HOW ARE CEREALS FORTIFIED?

- Flour fortification: large scale operations



HOW ARE CEREALS FORTIFIED?

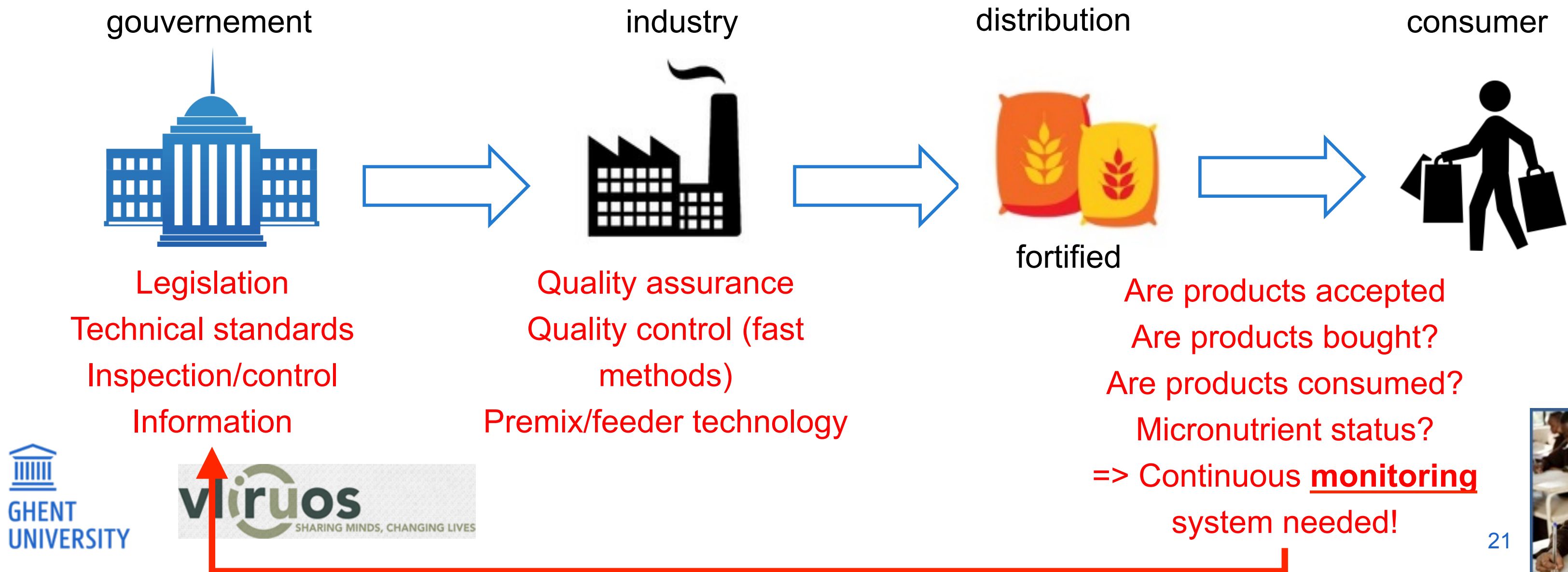
- Flour or meal fortification: small scale hammer mills



FLOUR FORTIFICATION IN AFRICA

FORTIFICATION: CHALLENGES

- Fortification operation: relatively easy
- Setting up national fortification programmes: challenge!



SUPPORTING FORTIFICATION IN AFRICA



- Partnership since 2008



- Aim: improve health in Africa through the enrichment of wheat and maize flour with essential vitamins and minerals



SMARTER FUTURES

- Supporting fortification efforts:
 - Development of **tools**:
 - Fortimas monitoring system
 - Cost benefit tool
 - Millers toolkit
 - Organising **trainings** and meetings
 - QA/QC of flour fortification
 - Country trainings on tools

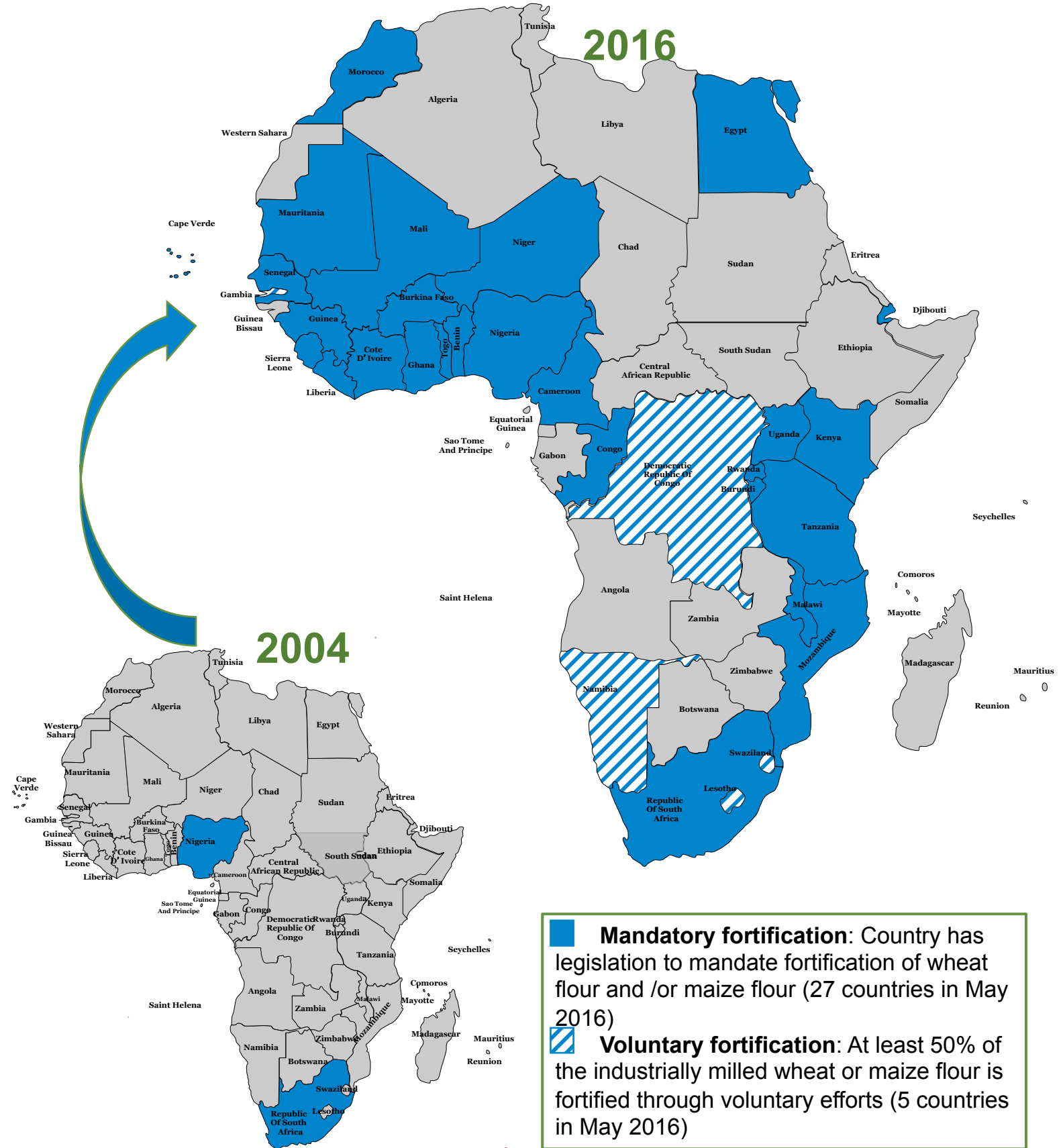
Capacity building

Knowledge transfer

Connecting stakeholders



Flour Fortification in Africa: 12 Years of Progress



QA/QC TRAINING KAMPALA MAY 2016



Makerere University
Kampala, Uganda, May 2016
Regional training

Stakeholders: millers, government
and academia: 79 participants (incl.
facilitators)

-> 20 student/lecturers from 7
countries: Uganda, Burundi, Rwanda,
South-Sudan, Kenya, Tanzania,
Mozambique

**14 scholarships sponsored by VLIR-
UOS (Belgium): Short training
initiative (STI)**

QA/QC TRAINING MAY 2016

Knowledge transfer:

- cereal processing
- fortification technology
- legislation & standards
- monitoring
- quality control



Field visits:

- Maize flour mill
- Gouvernement analytical lab (UNBS)

Discussion groups:






- Profession groups
 - Country teams
- => Developing strategy for fortification



MAIZE FLOUR FORTIFICATION

Maize availability and Fortification Legislation



-  Mandatory fortification legislation
-  Voluntary legislation
-  No availability or legislation data
-  75 or more grams available per person per day
-  Less than 75 grams available per person per day



MAIZE STRATEGY MEETING, DAR ES SALAAM, OCT 2016



Dar es Salaam, Tanzania
Maize strategy meeting

Stakeholders: millers, government involved from maize producing and consuming countries: 71 participants (incl. facilitators)



Knowledge: maize processing structure overview throughout Africa

Maize fortification technology + field trips to maize mills (large and small)

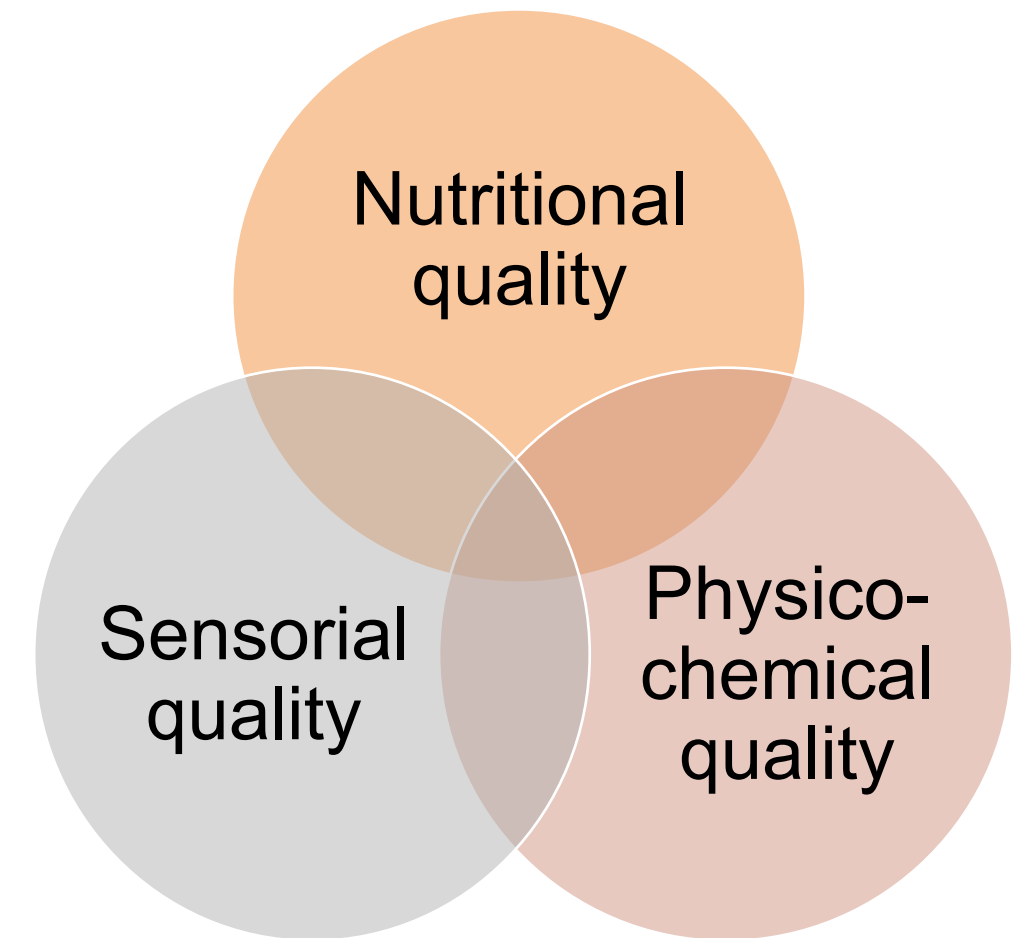
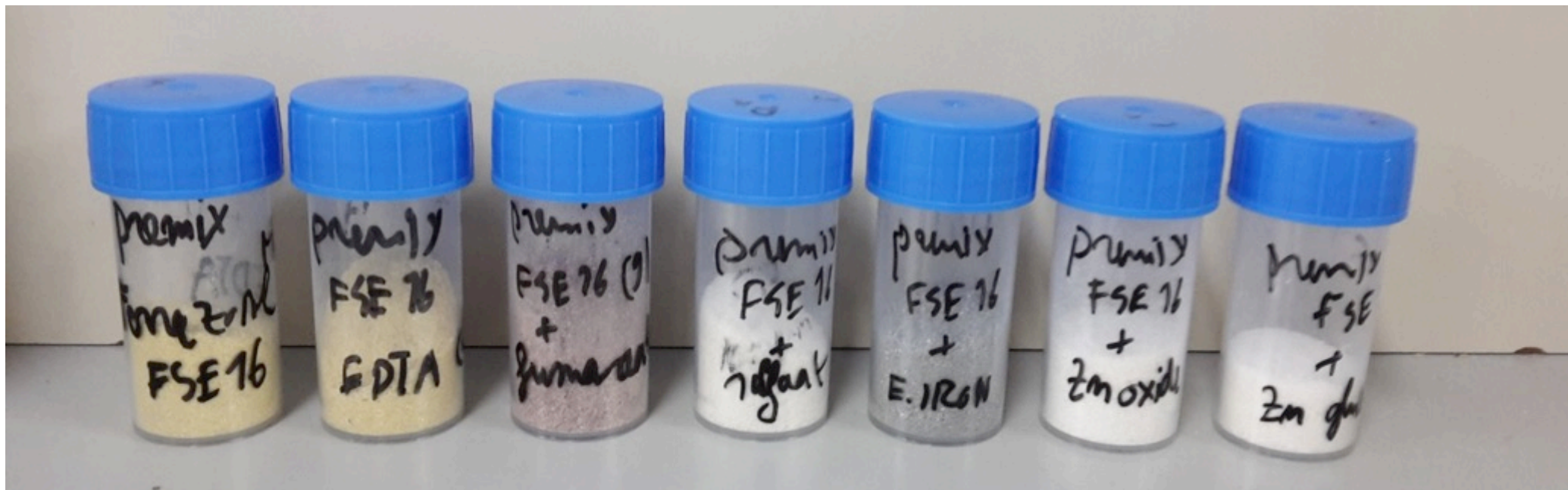
Declaration of Dar on maize fortification



ONGOING RESEARCH @GHENT UNIVERSITY

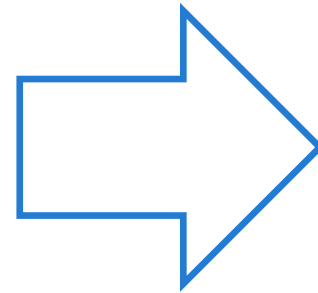
- Impact of different iron sources on wheat flour and maize meal functionality

FOOD QUALITY



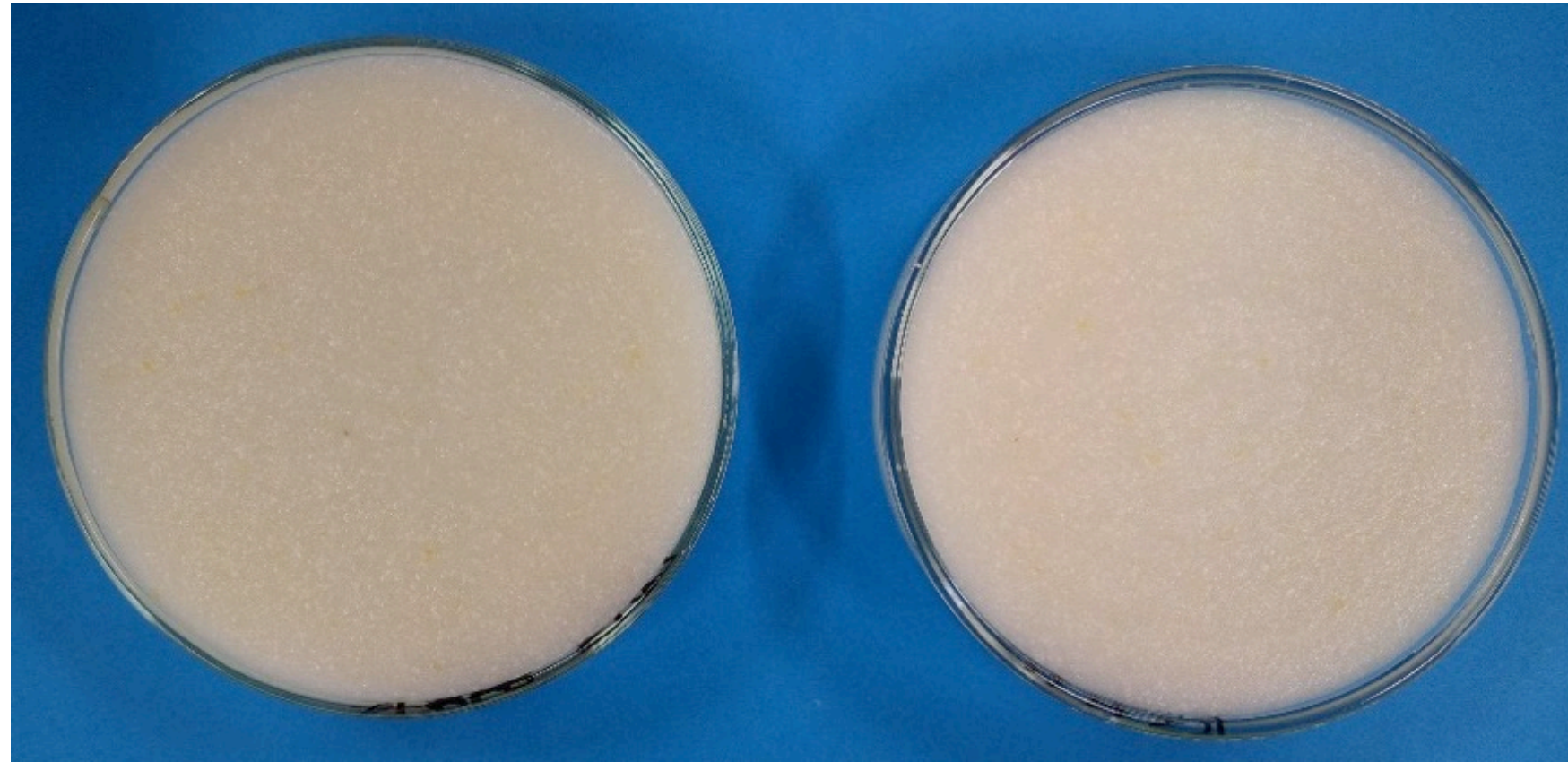
ONGOING RESEARCH @GHENT UNIVERSITY

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ONGOING RESEARCH @GHENT UNIVERSITY

- Impact of different iron sources on wheat flour and maize meal functionality



SuperSun

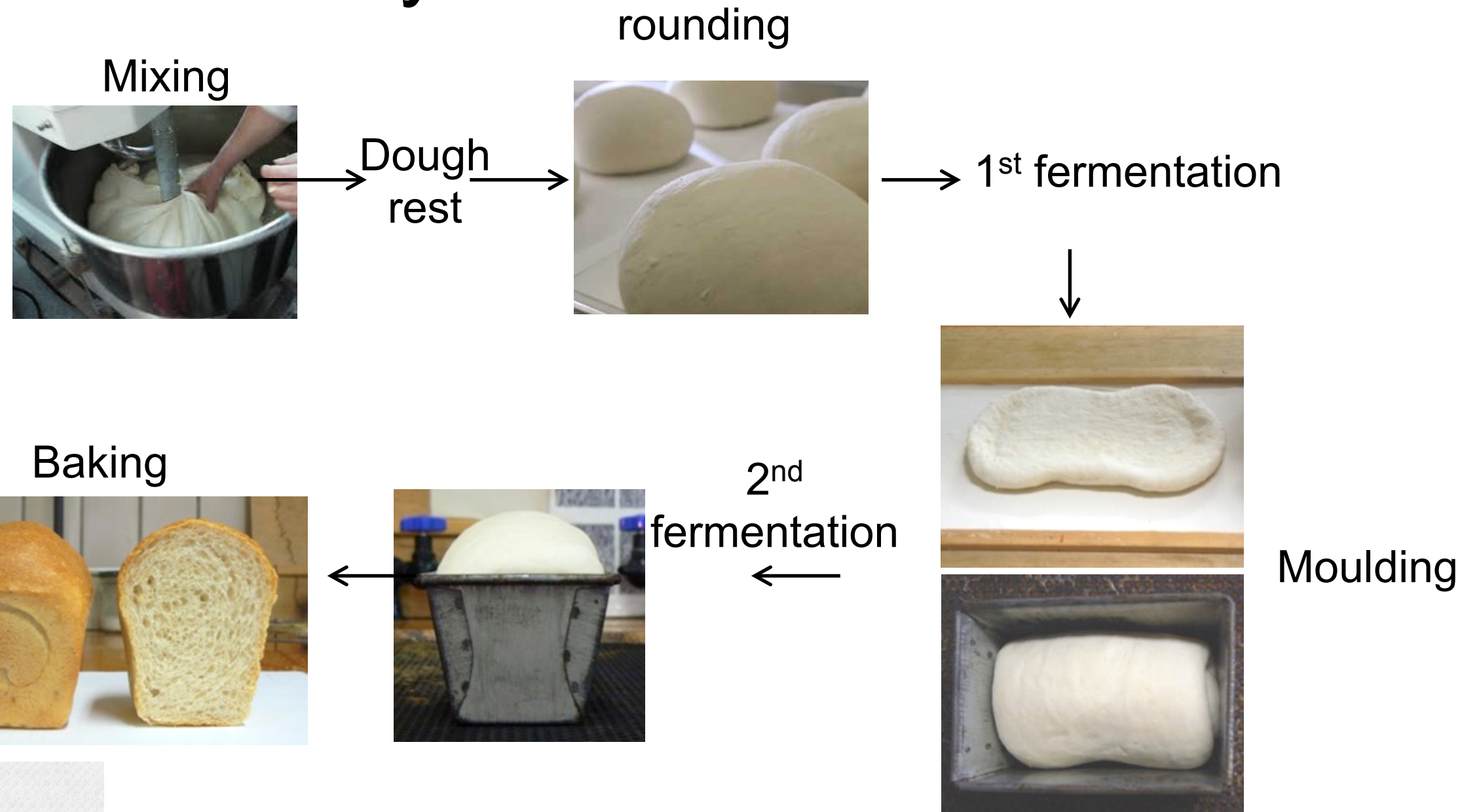
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Iwisa

ONGOING RESEARCH @GHENT UNIVERSITY

– Impact of different iron sources on wheat flour and maize meal functionality

wheat flour, water, yeast, salt, oxidants, emulsifiers, enzymes, vital gluten, other flours



ONGOING RESEARCH @GHENT UNIVERSITY

- Fast measuring techniques for fortificants: quality control



CONCLUSIONS

- Flour fortification: huge progress in last 10 years
 - Continuous support is needed
 - Capacity building in local universities/institutes
 - Technical support
 - Maize flour fortification needs some attention:
 - Which flour is fortifiable -> also commercial small hammer mills!
 - Partnerships strengthen each others efforts

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- VLIR-UOS
- Supporting partners

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