Flour Fortification: Overview and Benefits to Europe

Flour Fortification Initiative

A Public-Private-Civic Investment in Each Nation

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Flour Fortification Initiative Director
Former Cargill Executive

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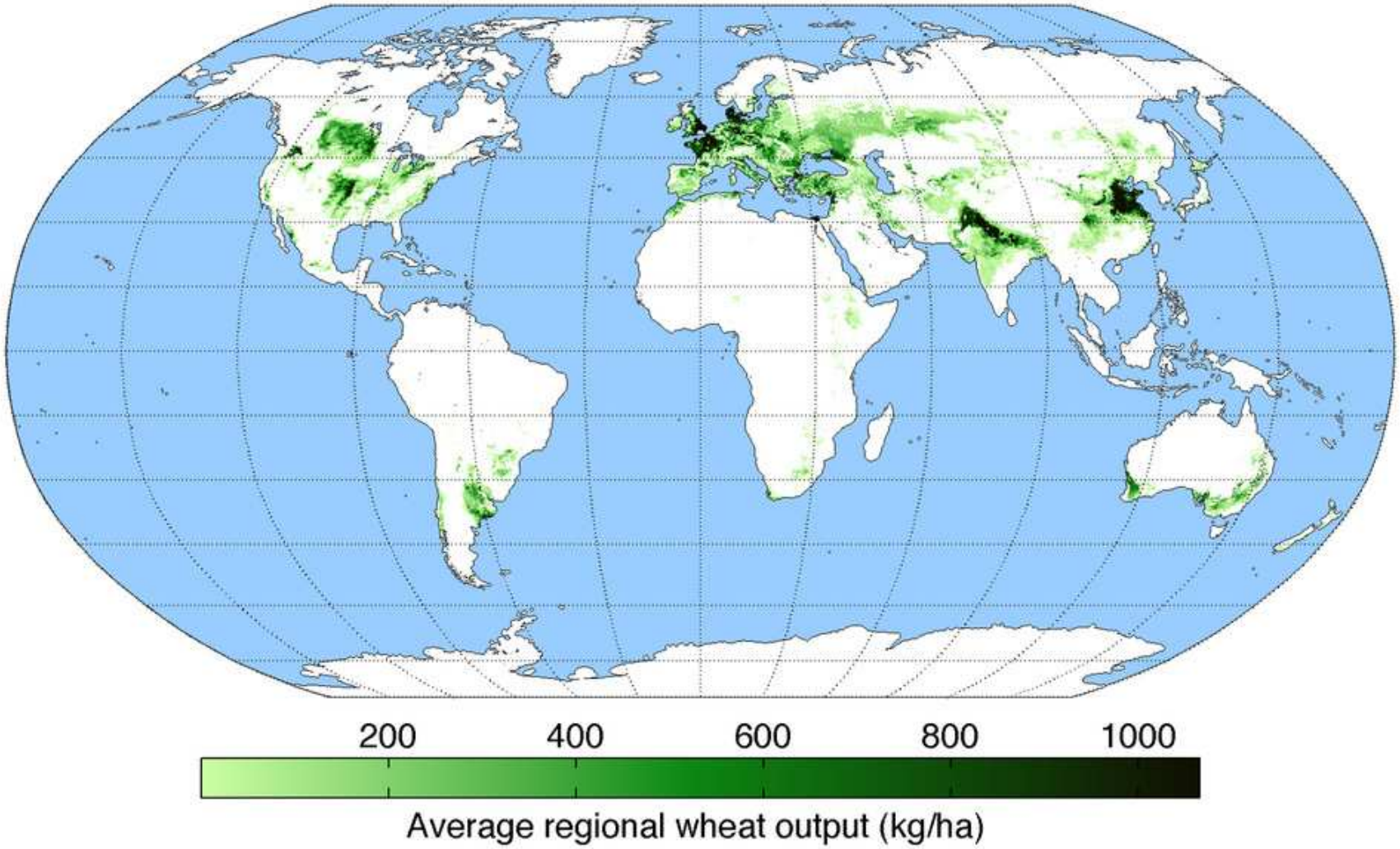
Agenda

- Europe's wheat production and consumption
- Wheat's nutrition
- Flour fortification:
  - Definition
  - Process
  - Progress
  - Standards
  - Success

Wheat Production



Wheat production (average percentage of land used for its production times average yield in each grid cell) across the world compiled by the University of Minnesota Institute on the Environment with data from: Monfreda, C., N. Ramankutty, and J.A. Foley. 2008. Farming the planet: 2. Geographic distribution of crop areas, yields, physiological types, and net primary production in the year 2000. Global Biogeochemical Cycles 22: GB1022

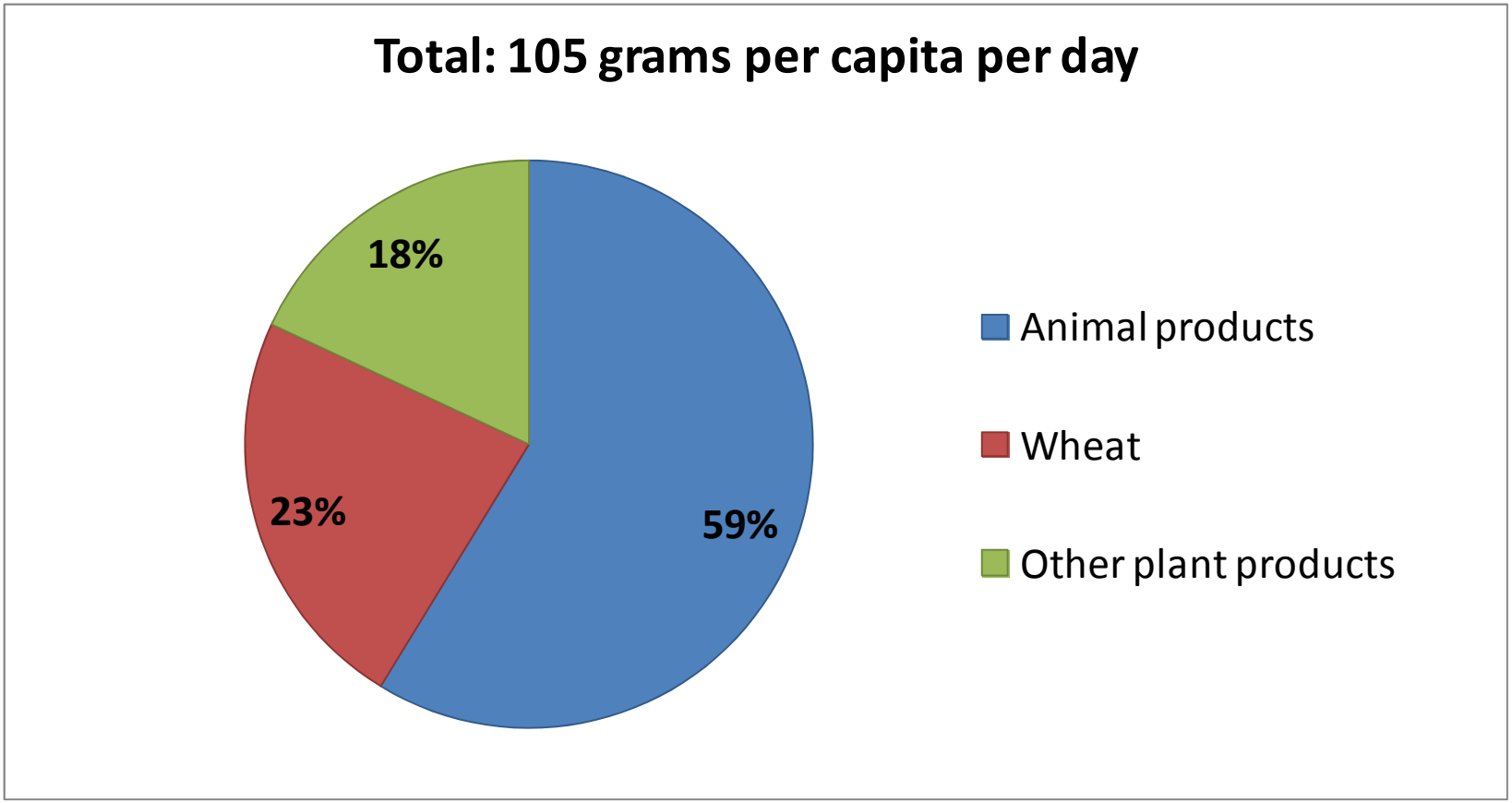
Europe's Wheat Industry

45 million	Tonnes of soft wheat and rye processed in the European Union each year
35 million	Tonnes of flour produced annually
3,800	Flour milling companies
65%	Average use of capacity
45,000	People employed in flour milling
600+	Types of flours to meet consumer demands
€ 15 billion	Turnover

Source: The European Flour Milling Association, Facts and Figures
http://www.flourmillers.eu/default.asp?structureID=320

European Union Protein Supply

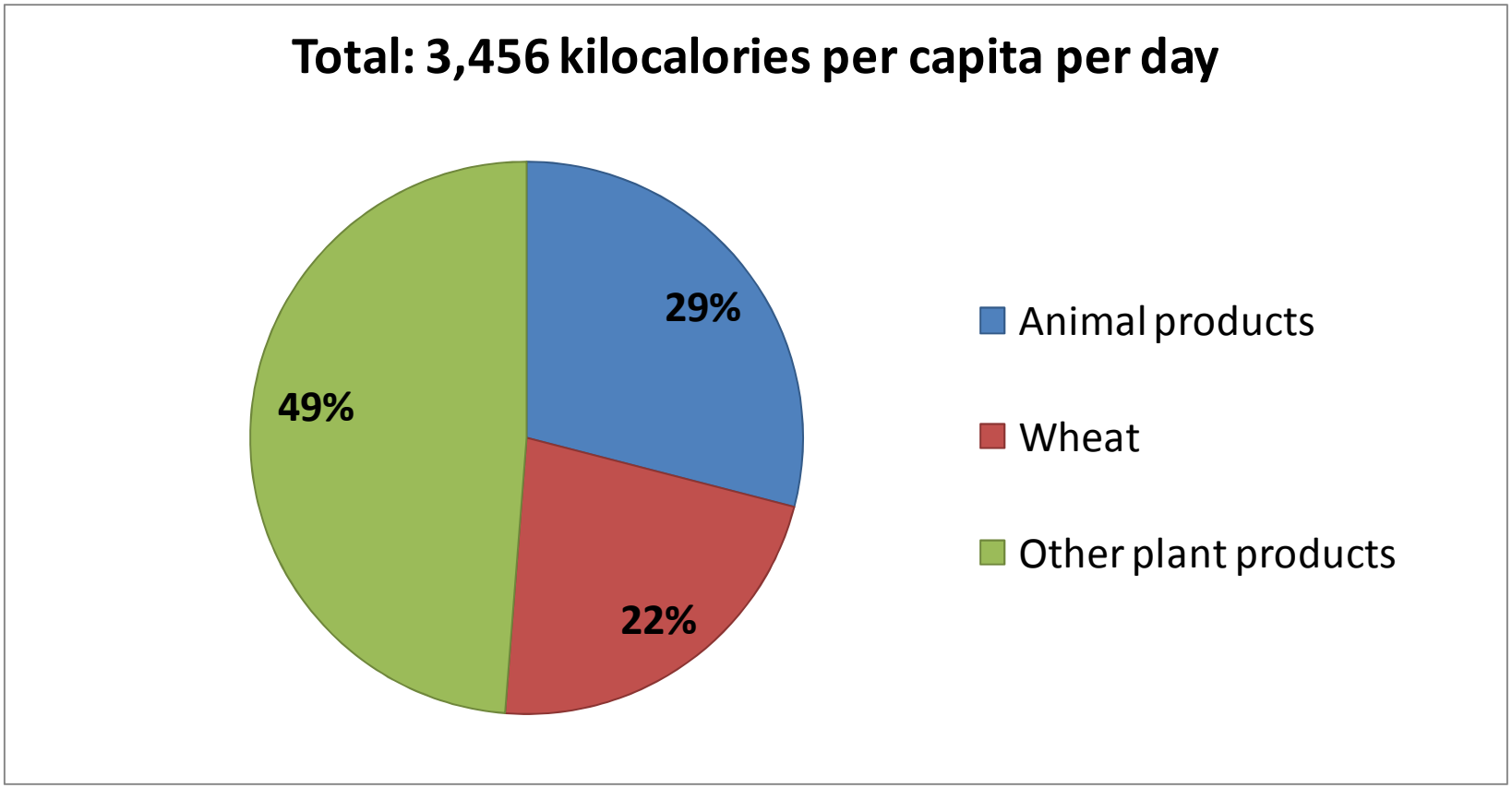
Wheat provides 24 grams of protein a day for 23% of total



Food and Agriculture Organization of the United Nations Food Balance Sheets for 2009.
http://faostat.fao.org/site/368/DesktopDefault.aspx?PageID=368#ancor

European Union Kilocalorie Supply

Wheat provides 22% of total calorie intake



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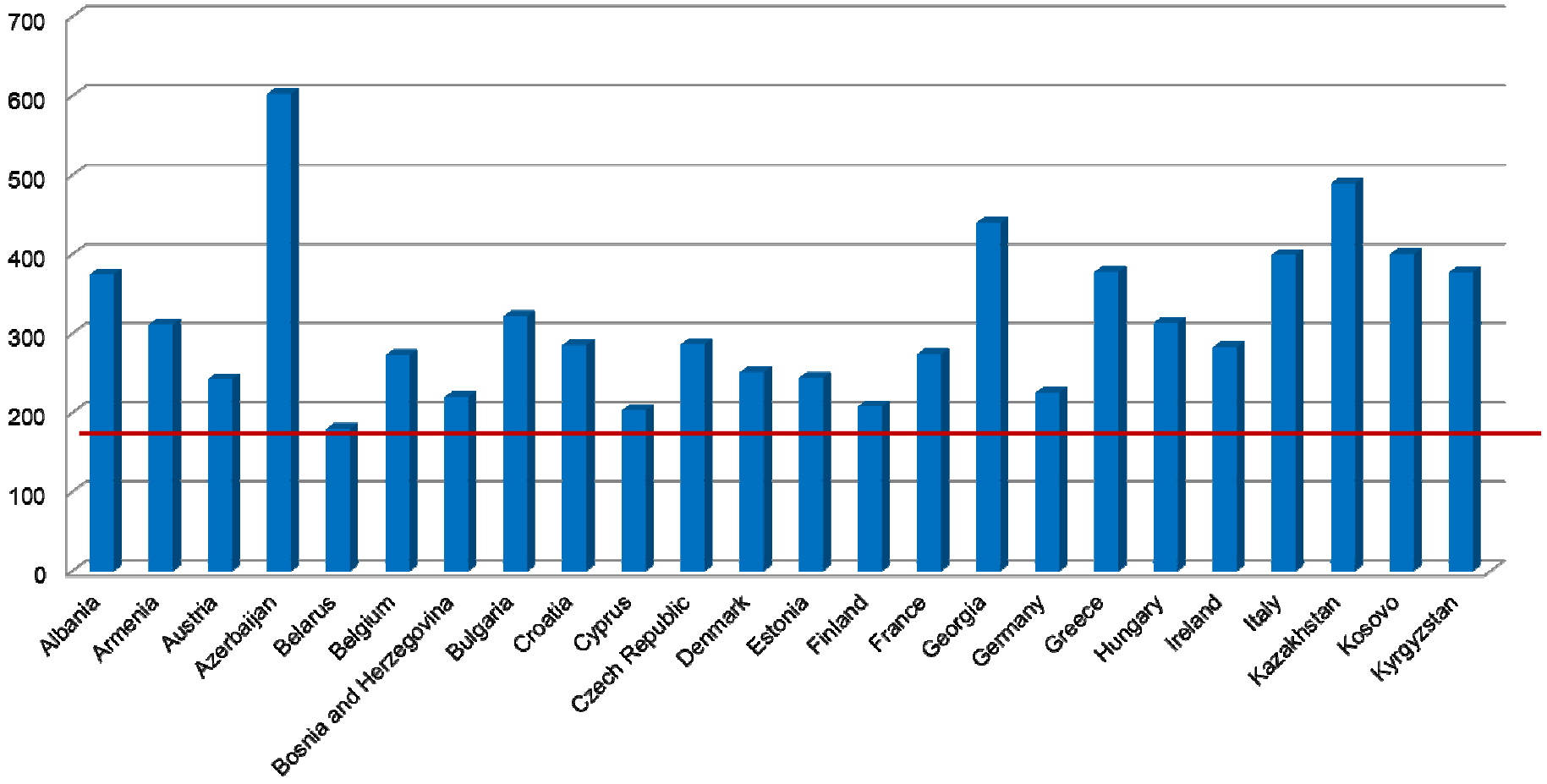
Wheat Availability in Food Supply

Grams per capita per day



Food and Agriculture Organization of the United Nations Food Supply. Figures represent a default composition of wheat, flour of wheat, macaroni, bread, bulgur, pastry, starch of wheat, breakfast cereals, and wafers.
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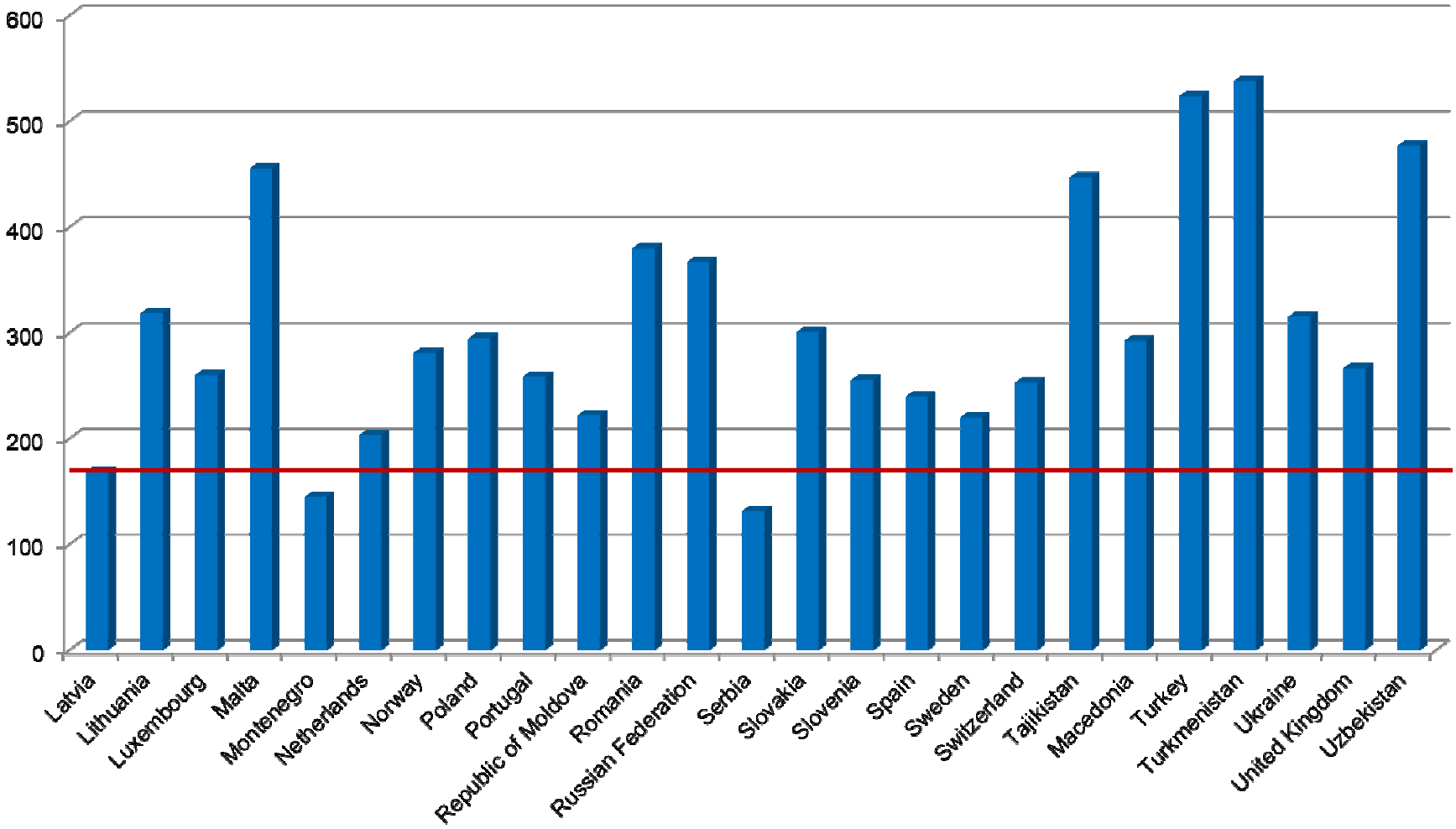

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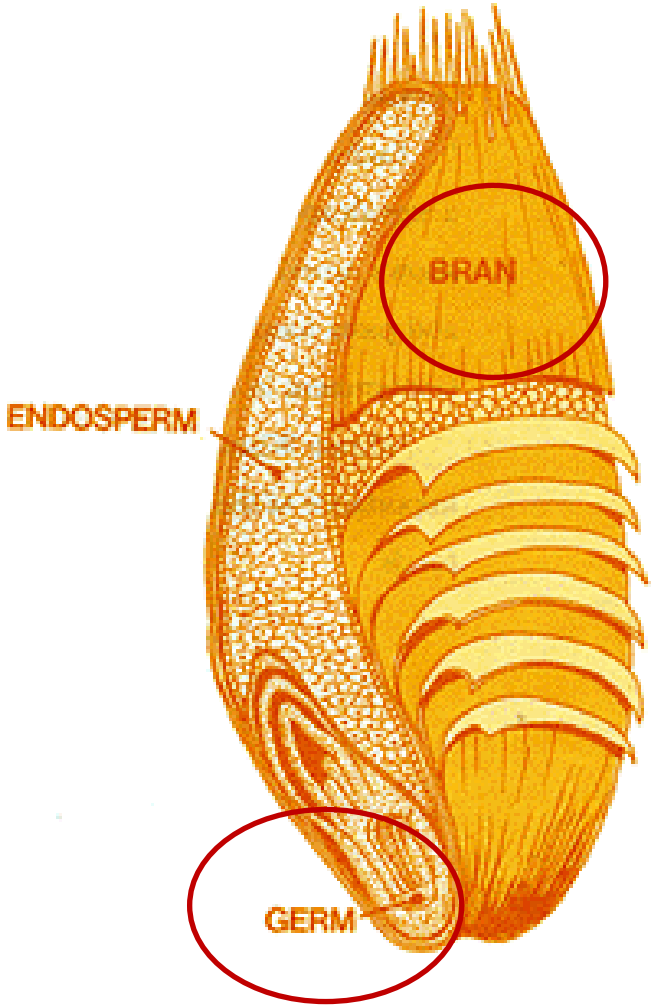
Wheat's Natural Nutrients



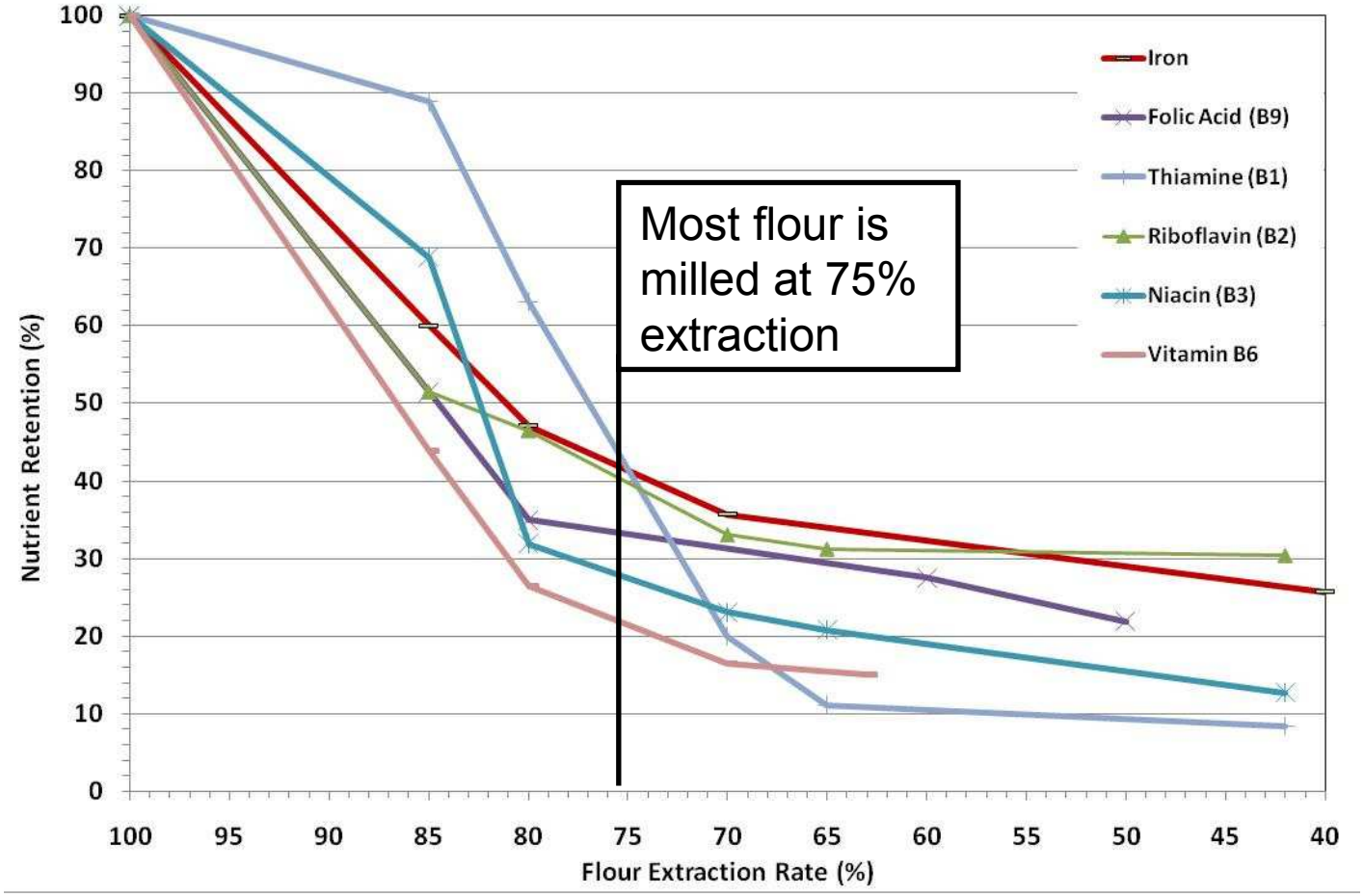
Whole grain wheat contains:

- Calories
- Protein
- Carbohydrates
- Dietary fiber
- Vitamins and minerals

Most vitamins and minerals are in the bran and the germ which are discarded during milling.

Essential Nutrients

Wheat and maize lose nutrients in the milling process.



Adapted from "Wheat in Human Nutrition" by W.R. Aykroyd and Joyce Doughty
Food and Agriculture Organization of the United Nations, Rome, 1970.

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What is Flour Fortification?

Fortification adds vitamins and minerals to flour during the milling process so that it is more nutritious.

Modern mill with three feeder lines

Fortification Process

- Millers order a vitamin and mineral premix based on their country standard (usually includes at least iron and folic acid).
- Premix is added to flour in the milling process.
- Millers conduct quality assurance testing.

Equipment used to feed premix into flour.

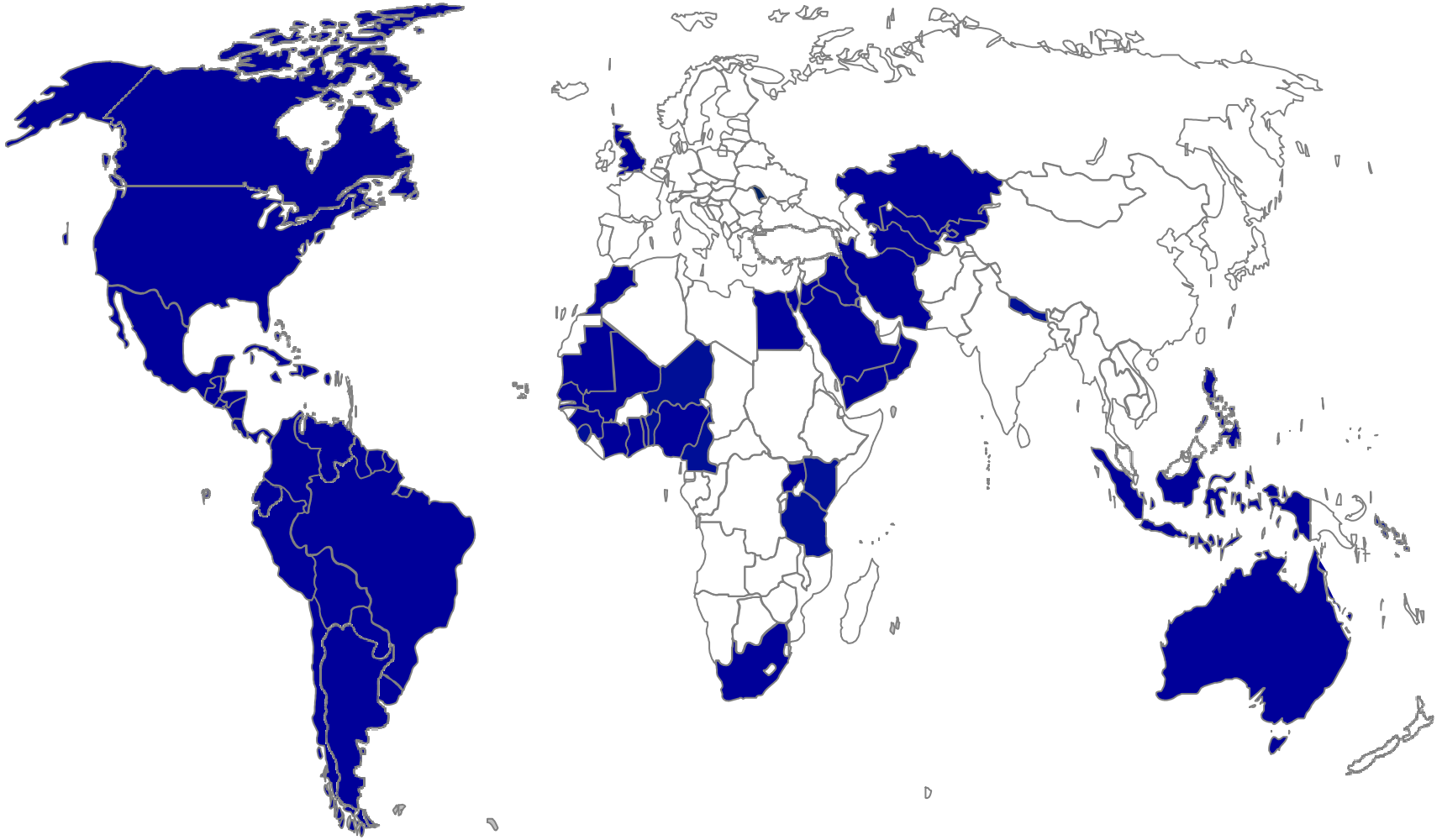
Flour Fortification Initiative

A Public-Private-Civic Investment in Each Nation

FFI is network of partners working together to make flour fortification standard milling practice so that people worldwide are smarter, stronger and healthier.

Wheat Flour Fortification Legislation

August 2012: 74 countries require at least iron and/or folic acid in wheat flour



Flour Fortification Progress

Since 2004:

- ✓ Fortified flour from industrial mills increased from 18% to 30%
- ✓ Number of countries with documented national regulations for mandatory wheat flour fortification increased from 33 to 74. The combined population of these 74 countries is more than 2 billion

Global Consensus

- Copenhagen Consensus (2004, 2008, 2012)
- World Health Organization statement (2009)
- UNICEF (annual support)

COPENHAGEN CONSENSUS CENTER

unicef

World Health Organization

Recommendations on Wheat and Maize Flour Fortification
Meeting Report: Interim Consensus Statement

PURPOSE

This statement is based on scientific reviews prepared for a Flour Fortification Initiative (FFI) technical workshop held in Stone Mountain, GA, USA in 2008 where various organizations actively engaged in the prevention and control of vitamin and mineral deficiencies and various other relevant stakeholders met and discussed specific practical recommendations to guide flour fortification efforts being implemented in various countries by the public, private and civic

THE FFI SECOND TECHNICAL WORKSHOP ON WHEAT FLOUR FORTIFICATION

Nearly 100 leading nutrition, pharmaceutical and cereal scientists and milling experts from the public and private sectors from around the world met on March 30 to April 3, 2008 in Stone Mountain, GA, USA to provide advice for countries considering national wheat and/or maize flour fortification. This *Second Technical Workshop on Wheat Flour Fortification: Practical Recommenda-*

Flour Fortification Standards

Table 1. Average levels of nutrients to consider adding to fortified wheat flour based on extraction, fortificant compound, and estimated *per capita* flour availability

Nutrient	Flour Extraction Rate	Compound	Level of nutrient to be added in parts per million (ppm) by estimated average per capita wheat flour availability (g/day)[1]			
			<75[2] g/day	75-149 g/day	150-300 g/day	>300 g/day
Iron	Low	NaFeEDTA	40	40	20	15
		Ferrous Sulfate	60	60	30	20
		Ferrous Fumarate	60	60	30	20
		Electrolytic Iron	NR[3]	NR[3]	60	40
	High	NaFeEDTA	40	40	20	15
Folic Acid	Low or High	Folic Acid	5.0	2.6	1.3	1.0
Vitamin B_{12}	Low or High	Cyanocobalamin	0.04	0.02	0.01	0.008
Vitamin A	Low or High	Vitamin A Palmitate	5.9	3	1.5	1
Zinc[4]	Low	Zinc Oxide	95	55	40	30
	High	Zinc Oxide	100	100	80	70

World Health Organization: Recommendations on Wheat and Maize Flour Fortification: Interim Consensus Statement. http://www.who.int/nutrition/publications/micronutrients/wheat_maize_fort.pdf

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Results of Insufficient Folate Status

- Leads to neural tube defects (NTDs) such as spina bifida and anencephaly
- Most of these birth defects are preventable.

Spina bifida is malformation of the baby's spine. It causes permanent disability.

Anencephaly is malformation of the baby's brain. It is always fatal.

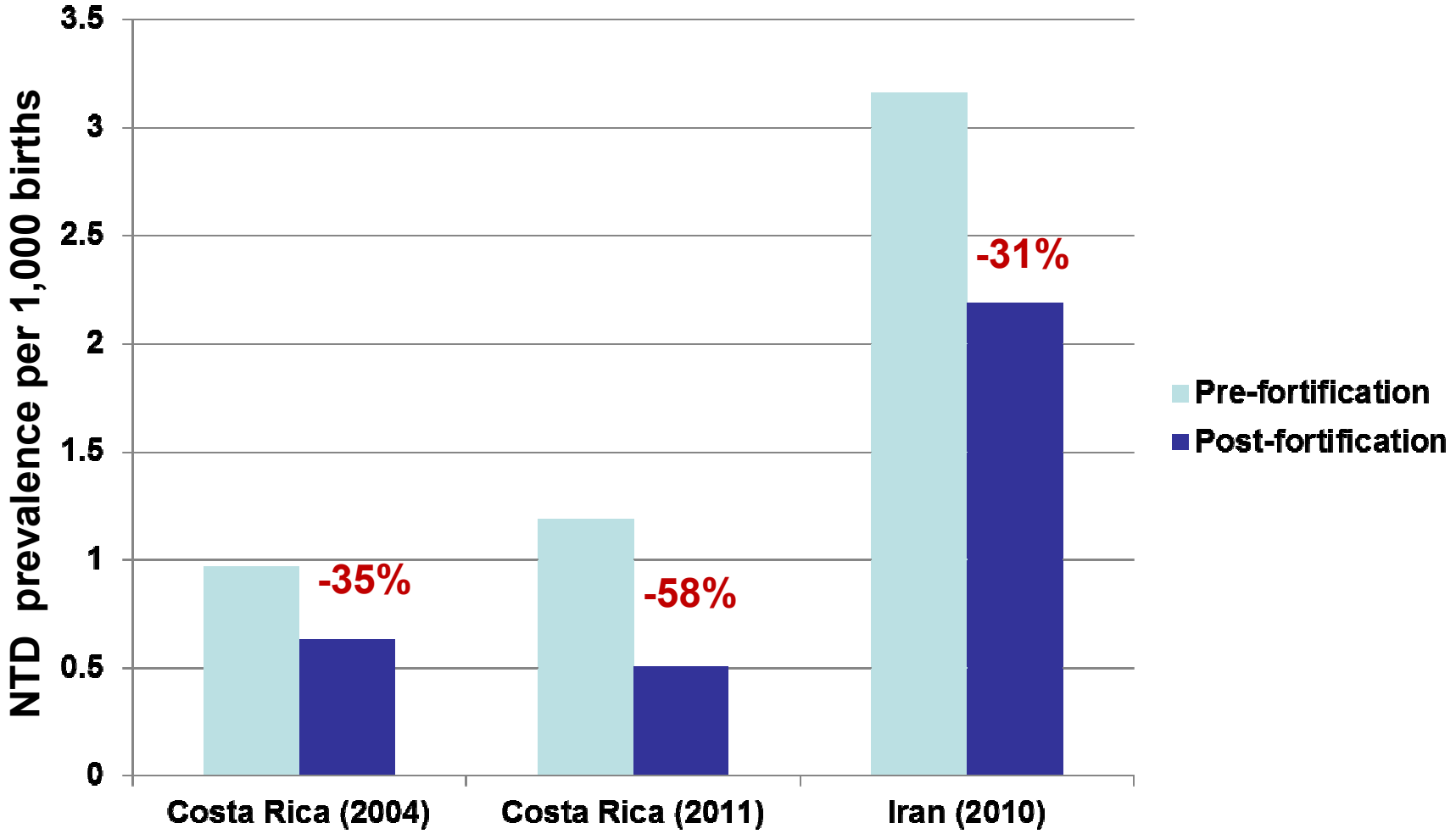
Centers for Disease Control and Prevention:
http://www.cdc.gov/ncbddd/folicacid/faqs.html

Success of Fortification For NTD Prevention

Meta-analysis published in 2010:	
8	Included 8 studies published between 2002 to 2008 by 8 different authors
5	Reflected studies using sub-national data in 5 countries: Argentina, Canada, Chile, South Africa, USA
<1	"Risk ratio" for each study was <1, indicating that fortifying flour with folic acid did prevent neural tube defects
31 – 78%	Neural tube defect reductions ranged from 31% to 78%
46%	Overall reduction in risk of neural tube defects was 46%

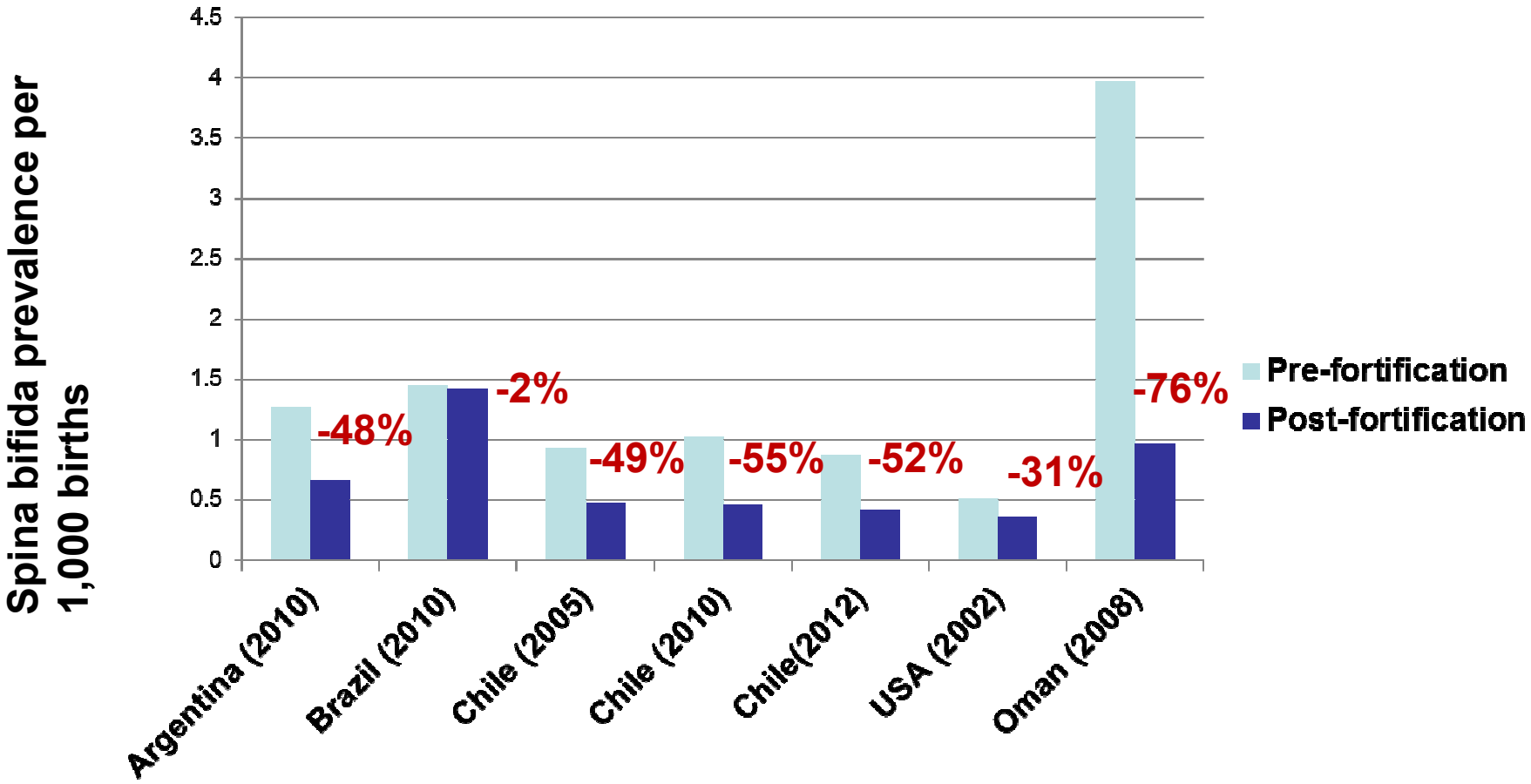
Blencowe 2010

Impact of flour fortification with folic acid on total NTD prevalence



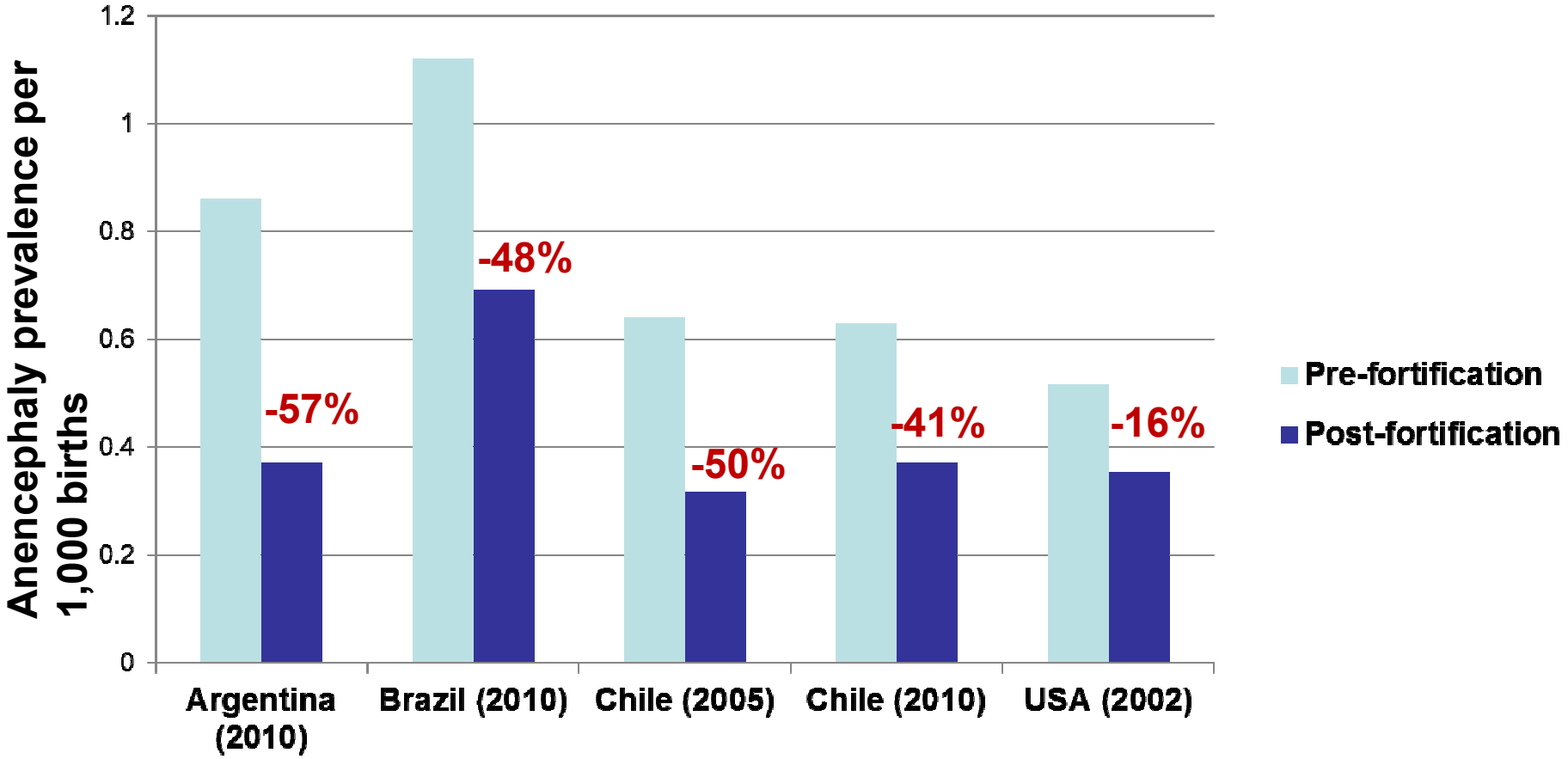
Abdollahi 2010, Chen 2004, Arguello 2004

Impact of flour fortification with folic acid on spina bifida prevalence



Lopez 2005, Lopez-Camelo 2010, Williams 2002

Impact of flour fortification with folic acid on anencephaly prevalence



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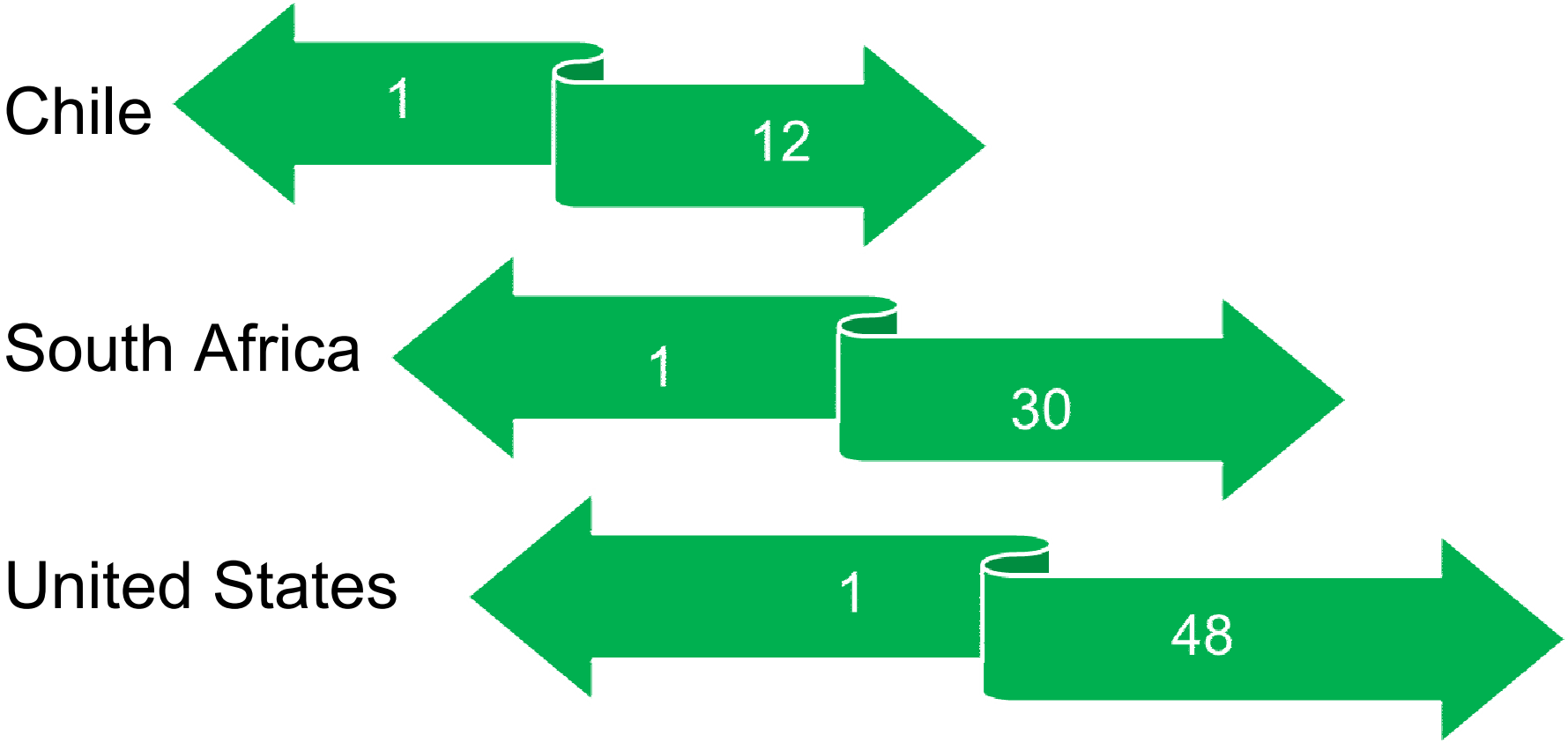
Cost:Benefit Ratio for Preventing Spina Bifida



Mandatory Legislation

- Equalizes costs for millers
- Sets appropriate standards
  - Best iron compound
  - Levels of other vitamins and minerals
- Can be more easily monitored

Global Best Practices

To plan a flour fortification program, consider:

- Local culture and cereal consumption
- Nutritional needs
- Industry analysis
- Creation of a multi-sector National Fortification Alliance
- Legislation

Thank You

For more information:

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