

Milk fortification experience in Chile.

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Chile

Inhabitants 15,000,000

Per capita GDP US\$ 4,800

Literacy rate : 96%

Urban population: 84.9%

Life expectancy : 75.2 years

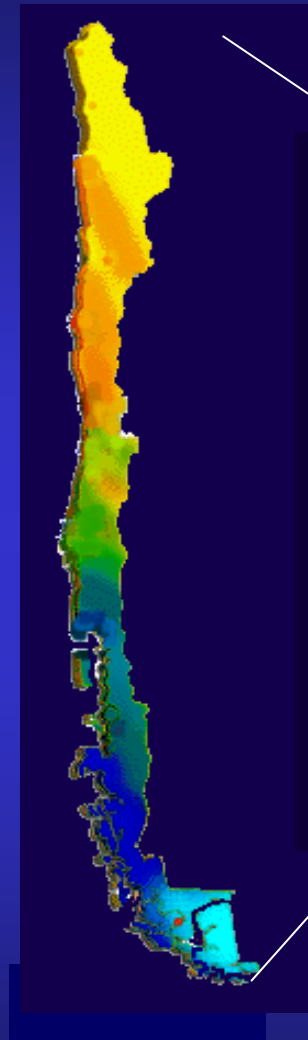
Infant mortality 2000: 9.8/ 1.000

Infant malnutrition > 1%

Average births per woman = 1.4%

Births in Maternity = 99%

Breast fed duration = 6m



Mother-Children Program (HPS) covers 70% of population in outpatient clinics. (100% of LSS)

Introduction

- Nutrition interventions are an important component of social planning in Chile.
- Since the 50's, the National Supplementary Food Program (NSFP) administered by the Chilean Ministry of Health through primary care health centers, provides free of cost milk based complementary foods to children from birth to 5 years of age.

- In conjunction with the National Supplementary Food Program, is the monthly health care program, which includes:
 - growth and development monitoring,
 - breast feeding promotion,
 - immunizations and
 - education in nutrition.
- Currently 70% of Chilean children under 5 years of age are receiving this benefit

- Since the 80's, Stekel et al, at INTA demonstrated the efficacy of milk fortified with iron and ascorbic acid in the prevention of IDA in Chilean infants.

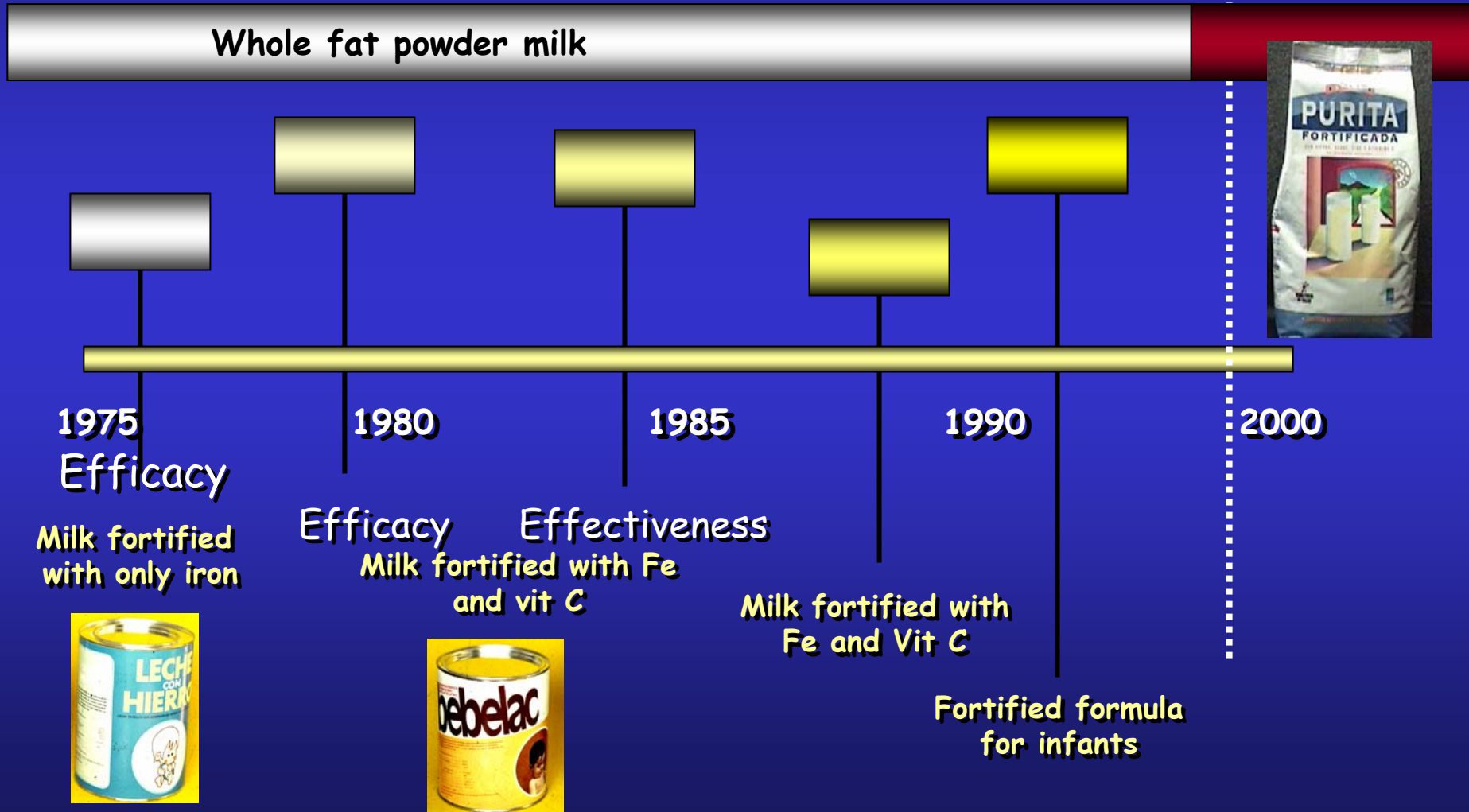
- Only in 1999, Ministry of Health authorities decided to replace the unfortified milk (Leche Purita) for a fortified one (Leche Purita Fortificada).

- Previous, to the national implementation bioavailability, stability, and organoleptic studies were performed. A new package was designed and an acceptability field survey was done.

Fortifying milk with iron in Chile

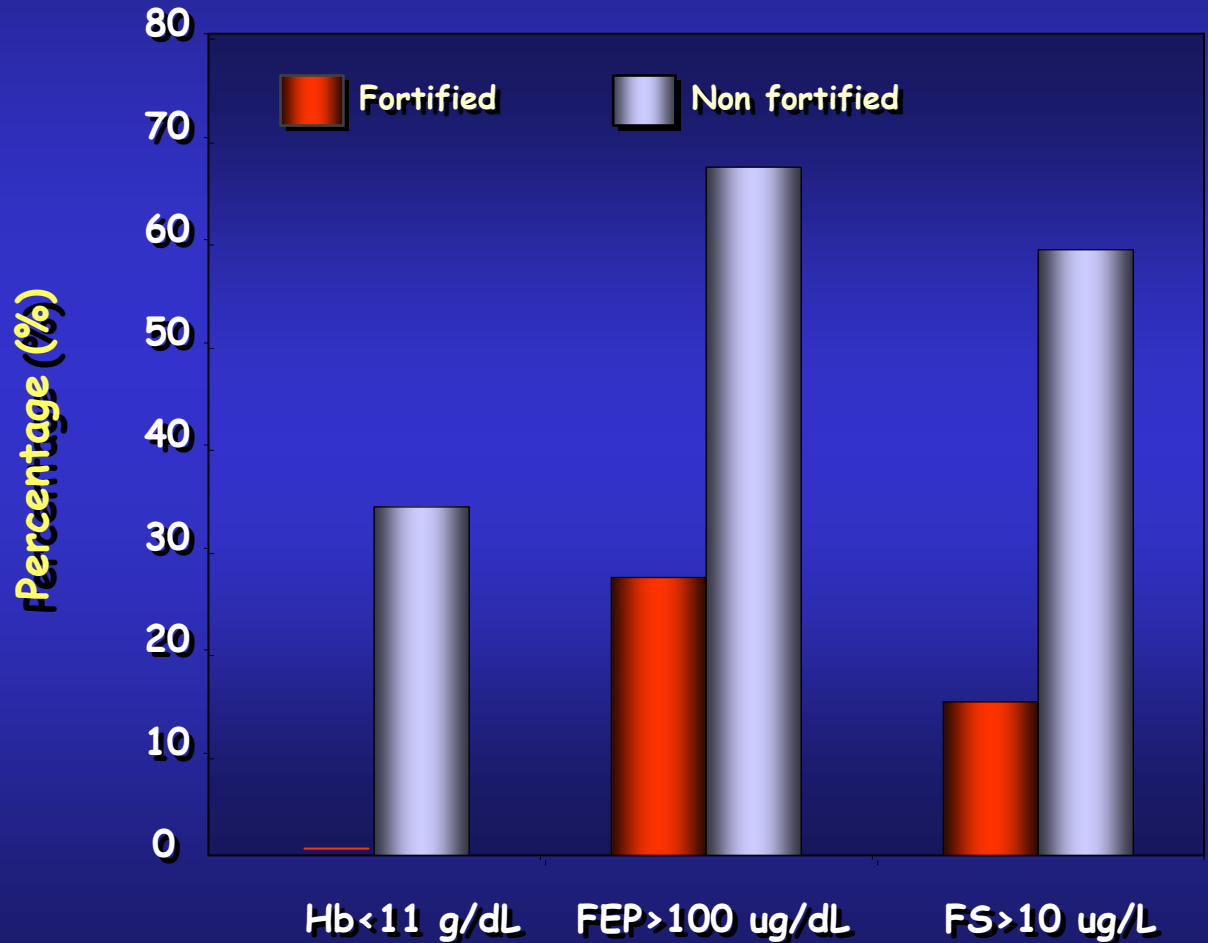
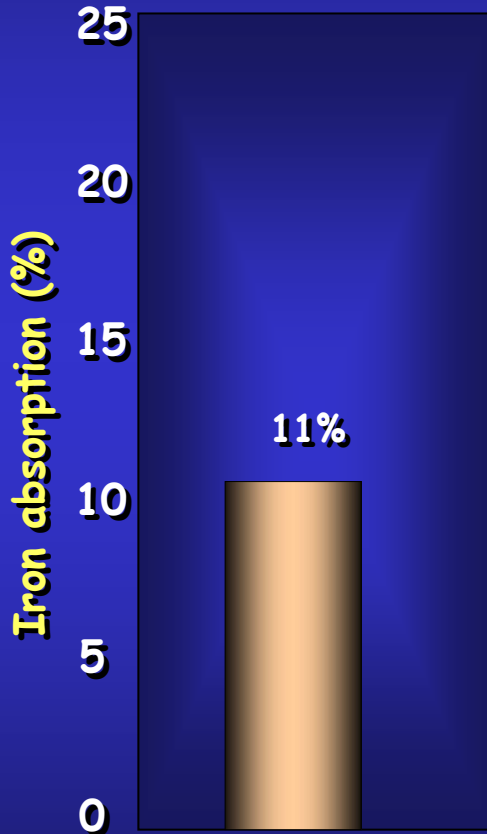
Fortified milk

NSFP: children under 2 years of age.



Milk fortified with Fe and vitamin C (non-acidified)

Hertrampf et al. Rev Med Chile 1990; 118: 1130-1337



Since 1999, Chilean National Supplementary Feeding Program delivers free of cost 2 kg/month of a full fat powdered milk to the 70% of infants from birth to 18 months of age. Lactating mothers consume it until their infants are weaned.



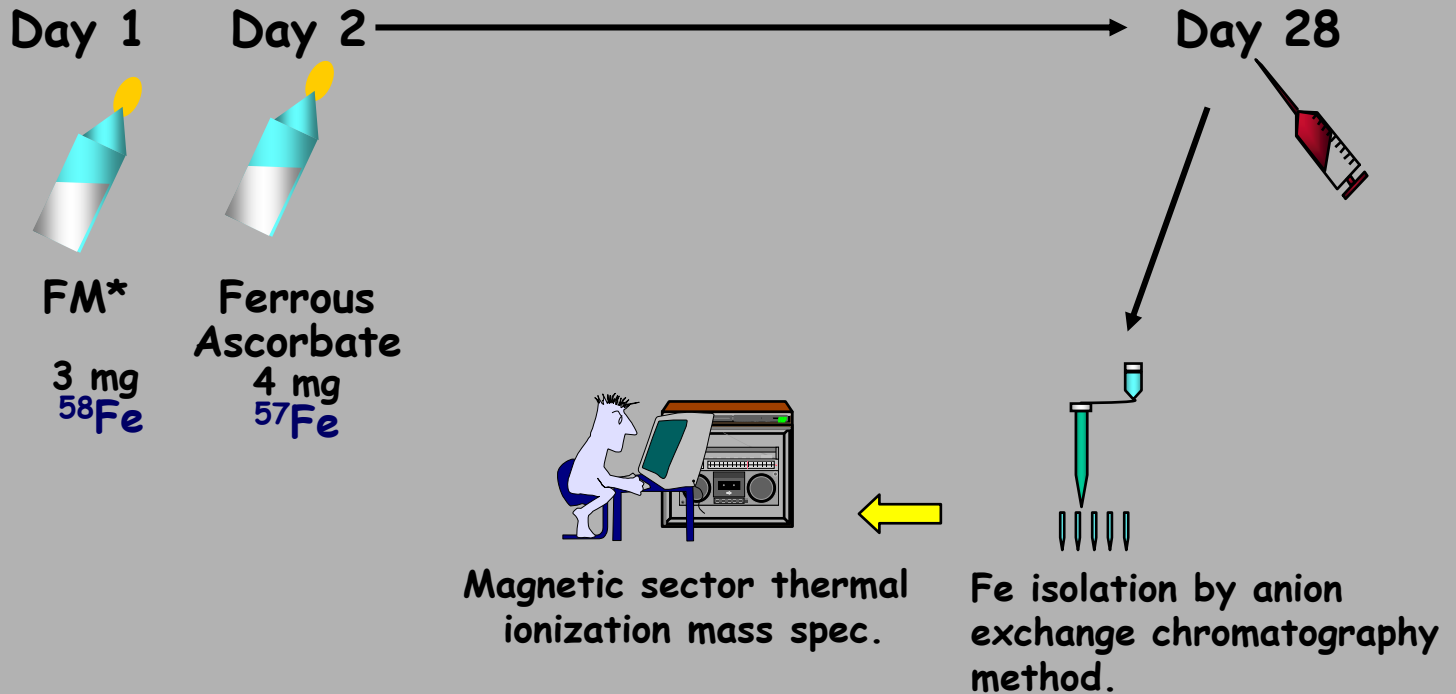
Fortified with	mg/100g
Iron (ferrous sulfate)	10
Ascorbic acid	70
Zinc (zinc sulfate)	5
Copper (copper sulfate)	0.5

Shelf life = 6 months in a multilayered packaging with a nitrogen flushing.

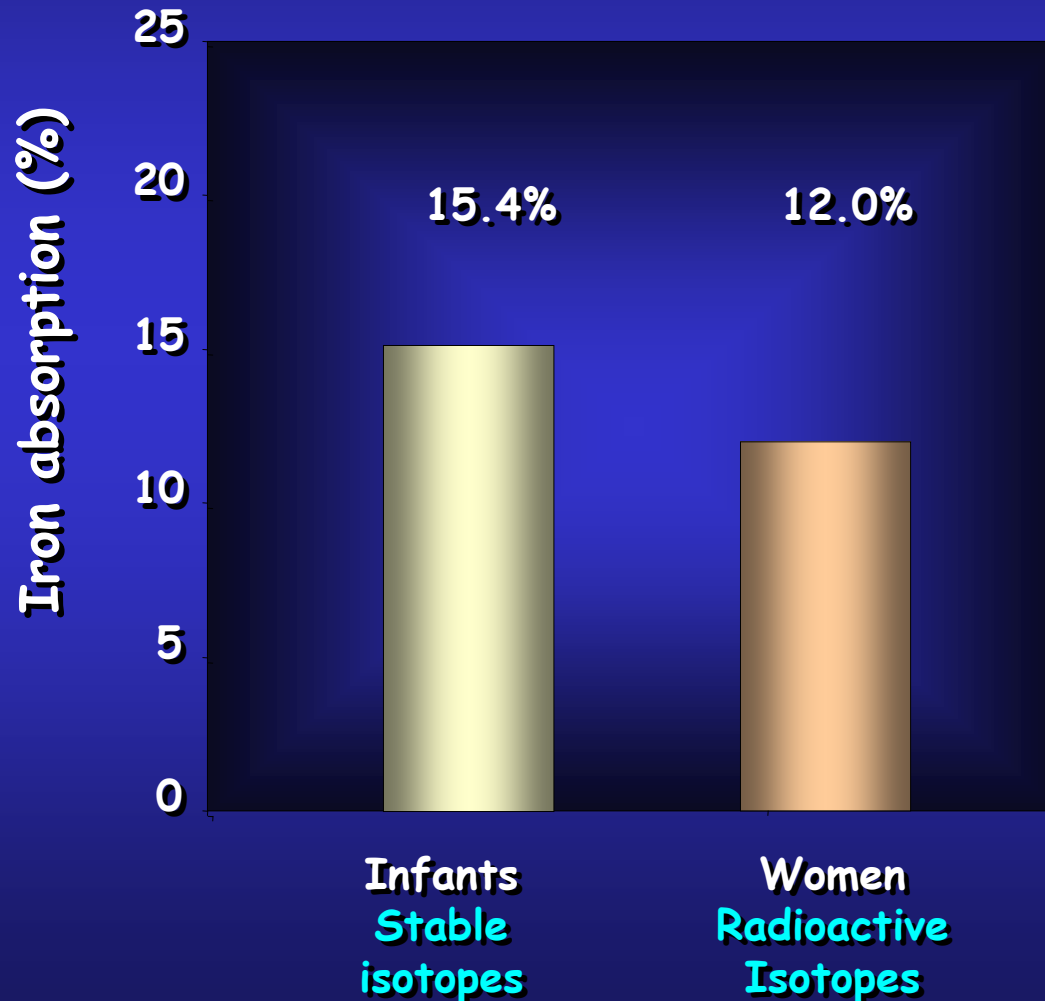
Acceptability = good, similar to non-fortified milk.

Leche Purita Fortificada®

Iron bioavailability from fortified milk. Design in infants using stable isotopes



Iron absorption from iron fortified milk measured in infants and women



Iron supply from fortified foods delivered through Chilean NSFP.

	Iron absorption (%)	Daily consumption	Iron absorbed* mg/day
Fortified Milk	15.4	500 ml	0.8
Fortified drink	12.4	500 ml	0.4
Vegetable purée	6.0	100 g	0.3

*Iron requirement : 1.0 mg/day

Evaluate effectiveness of the fortified milk on the prevention of IDA and ID in children under the real conditions of distribution by the National Supplementary Food Program.

Effectiveness study design

August 1999

Pre - fortification
June-July 1999

Primary Care Health Clinic
Southern Area of Santiago

12-18 months infants
covered by the
National Supplementary
Feeding Program,
attending to receive
immunizations

N=128

Post-fortification
June-July 2000

Primary Care Health Clinic
Southern Area of Santiago

12-18 months infants
covered by the
National Supplementary
Feeding Program,
attending to receive
immunizations

N=125

Hemocue
FEP
Serum ferritin

Characteristics of infants studied.

	Pre- fortification N=128	p	Post- fortification N=125
Age (mo)	15.3	NS	15.6
Sex fem. (%)	53.1	NS	45.6
<2.500 g BW (%)	3.9	NS	7.2
<3.000 g BW (%)	18.0	NS	15.0
Fe supplements (%)	22.0	NS	21.0
Breast fed* (ms)	5.0	NS	5.9

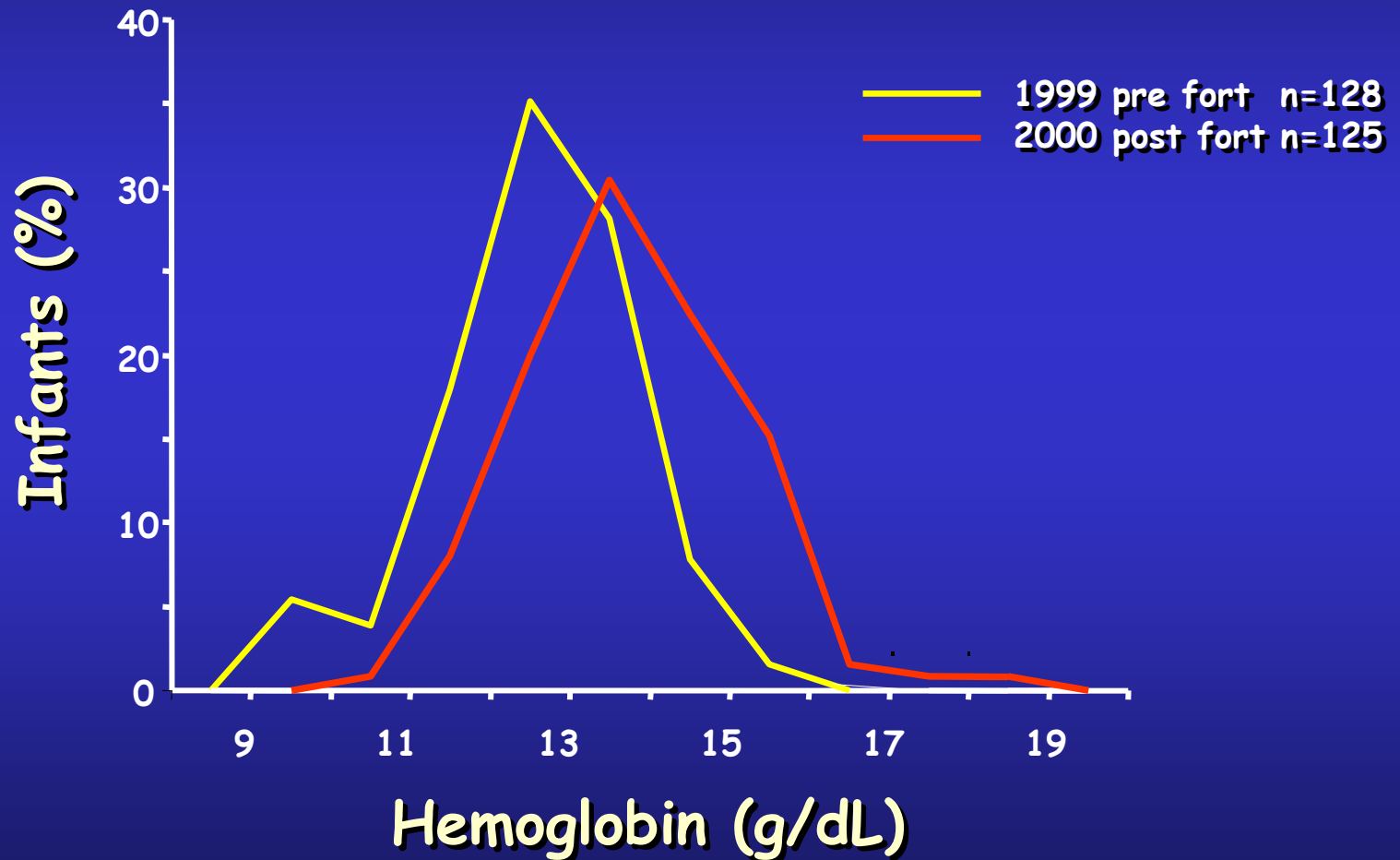
*Human milk as the only source of milk

Iron nutrition status of infants

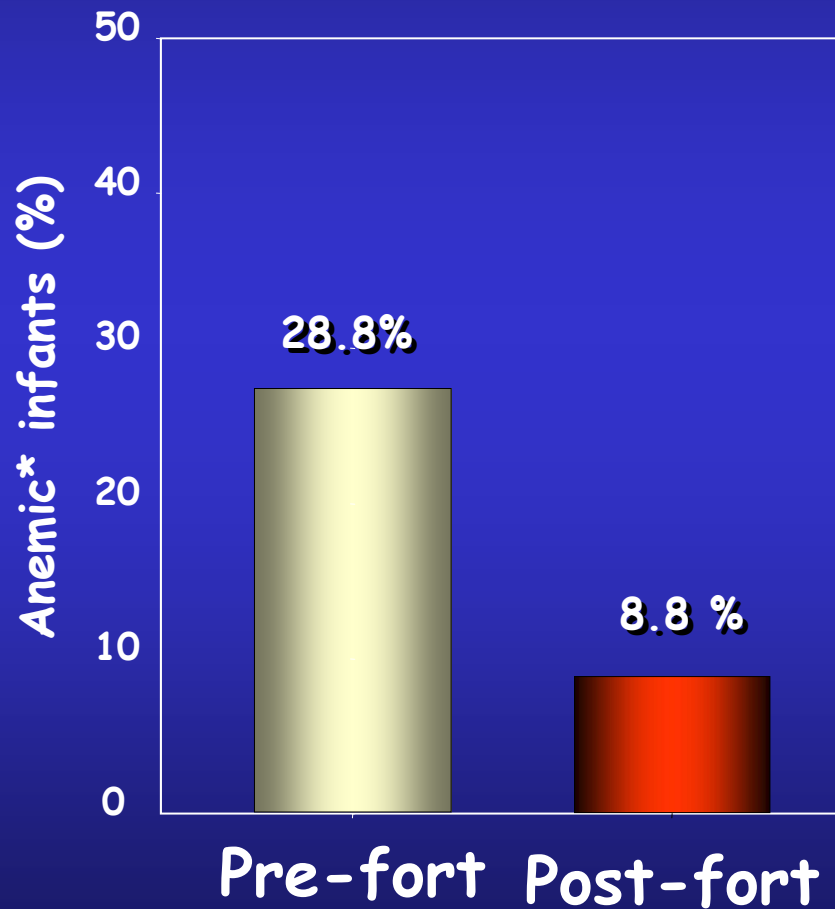
	Hgb (g/L)	FEP (μ g/dL RBC)	Ferritin* (μ g/L)
Pre-fortification n=128	115 \pm 12	131.4 \pm 60.7	13.3 (6.1-29.0)
P	<0.0001	<0.0001	<0.0001
Post-fortification n=125	125 \pm 13	97.9 \pm 51.8	15.7 (7.6-32.5)

*Geometric mean and range of 1 SD

Effect of fortified milk on hemoglobin distribution

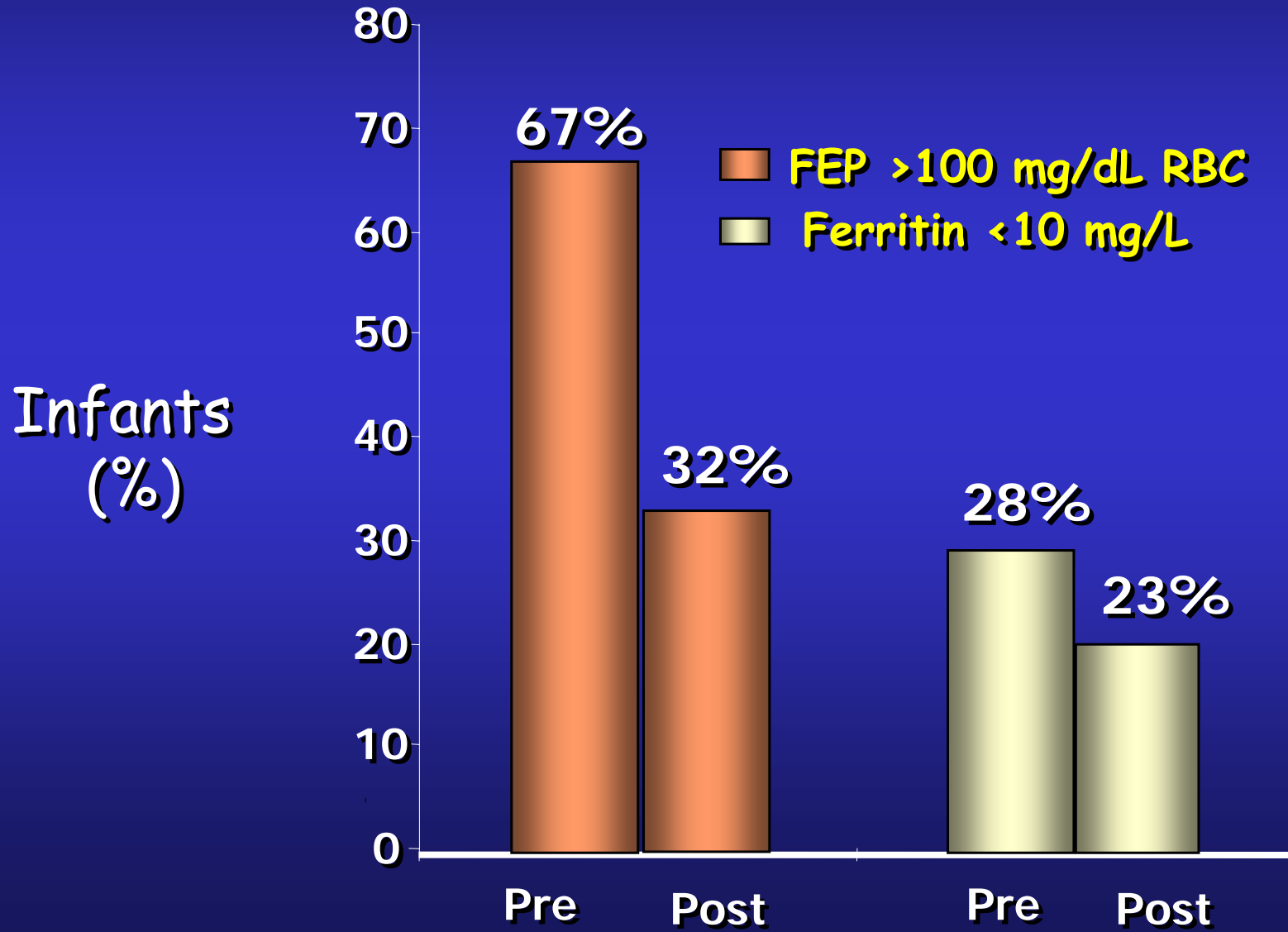


Effect of fortified milk on anemia prevalence in Chilean infants



*Hgb<11g/dL

Effect of fortified milk.



Conclusions.

The delivery of a fortified powdered full fat cow's milk through the National Supplementary Food program in Chile is effective in preventing iron deficiency anemia and iron deficient erythropoiesis in infants between 12 and 18 months of age. There is not a significant impact on iron stores.