

## Sharing United States Technology to Aid in the Improvement of Nutrition (SUSTAIN)

The consequences of iron deficiency anemia (IDA) stretch well beyond the much-advertised symptom of fatigue. Iron deficiency dramatically lowers resistance to infections. It impairs muscle function, limiting the ability to do sustained work and lowering economic output for developing countries by as much as 20%. When young children are iron deficient, normal cognitive development is permanently disrupted, jeopardizing their nation's intellectual legacy.

Researchers at SUSTAIN recognized the problem. Together with governments and regional groups, they began to work toward an answer for Latin America: add iron and other essential micronutrients to the staple corn products consumed by the majority of Latin America's poorest citizens. As SUSTAIN consulted with leaders in the food industry, science, and government, agreements were forged and solutions to micronutrient malnutrition blossomed.

Then came the roadblock—iron. Supplemental vitamins were easily added to cornmeal. But iron, a highly reactive element, presented problems. Iron salts, such as ferrous sulfate, are most easily absorbed by the body but turn corn products blue and rancid. Elemental iron powders, which do not alter color or shelf life, are poorly absorbed. And of the multiple forms of iron powder in use, no one knew which was the best choice.

Governments saw the need for iron supplementation, scientists understood the chemistry of iron absorption, and food manufacturers realized no one would consume an unappetizing product. Elizabeth Turner, Executive Director of SUSTAIN, says, "The science community was looking at iron products that appeared to have higher levels of bioavailability, but industry was looking at the products that were fairly inexpensive and relatively stable in the food product. What had seemed a promising approach to combating IDA began to falter in the face of confusion and dissent.

These challenges refocused SUSTAIN's role in iron fortification for the developing world. As SUSTAIN explored the problem, they realized that the scientific community needed consensus before governments and the food industry could act.

### Science Decides

To help resolve these issues, SUSTAIN gathered together researchers in iron formulation and metabolism from around the world in Monterrey, Mexico, to discuss and debate the scientific data. Dr. Sean Lynch, a consultant to SUSTAIN, was one of the participants. There was a large body of information about iron, says Dr. Lynch, but little consensus about how best to put it into food. "Industry does need to make it cost effective. This is one of the things that we in our ivory towers have tended to ignore. But I don't think it's true that industry is not interested in changing things. It was a real revelation to me at the Monterrey conference how interested they actually were, and how far apart we were in terms of our understanding of what the other side knew."

Based on the conclusions of the Monterrey conference, SUSTAIN has published Guidelines for Iron Fortification of Cereal Food Staples. This document is now the standard reference for food manufacturers, governments, and non-governmental organizations. SUSTAIN is continuing to advance

the science of iron metabolism by rigorously studying currently manufactured iron powders, verifying which form best replenishes iron in malnourished populations, and how its bioavailability can be improved. It has also been actively involved in the quality assessment of micronutrient additives to products manufactured in the United States for delivery to the developing world.

By bridging the historically separate interests of private and public participants, SUSTAIN has become a quiet force behind food fortification efforts throughout Latin America. In 1998, the government of Mexico decided to combat micronutrient deficiency by feeding essential vitamins and minerals to its people in their most traditional food product—tortillas. Gruma Maseca, the major manufacturer of the corn masa flour used to make tortilla dough, needed advice on the best food fortification technology. They turned to SUSTAIN and found the help they sought. At a cost of only pennies per ton of flour, Maseca is adding iron and vitamins to tortillas eaten by millions of Mexicans each day.

Two grants from the Bill & Melinda Gates Foundation, totaling \$2.7 million, are helping SUSTAIN unite the efforts of science, government, and industry to give half the world's inhabitants the iron they now lack. SUSTAIN's pivotal, mediating role is saving millions of lives each year.

We would like to thank the following SUSTAIN researchers and partners for their contributions to this article:

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