

## Ingredient Application

# Fortifying with Iron

New iron form readily disperses without precipitation



■ Korea's Maeil Dairy iron fortifies milks targeted to small children.

The amount of iron in the human body is very small, a mere 3-5g. Though it's not much, every little bit is essential for life. After all, iron is responsible for transporting oxygen in the bloodstream. It transfers oxygen into cells and carbon dioxide out of cells, making iron indirectly essential for energy metabolism. This is why people with low iron diets tend to be fatigued.

Daily dietary requirements for iron vary by individual and are affected by factors such as growth periods for kids and menstrual cycles and pregnancy for women. The National Academy of Sciences set the Recommended Dietary Allowance for men and post-menopausal women at 8mg a day and at 18mg for premenopausal women. For pregnant women, it is 27mg, and for those breast-feeding and not menstruating, it is 9mg.

Because the average U.S. daily diet contains 12-15mg of iron, to prevent iron deficiency in high-need population segments, doctors often recommend iron supplements. Interestingly, those consumers requiring more iron are the same population segment that needs more calcium. This presents dairy foods manufacturers with an incredible opportunity to add value to their products through iron fortification.

Unfortunately, "Many iron sources that exhibit the best bioavailability, such as ferrous sulfate, adversely affect food and beverage quality by accelerating lipid oxidation, producing unfavorable color or flavor and causing severe irritation of the gastrointestinal system," says Lekh Juneja, managing dir., nutritional foods div., Taiyo Kagaku, Japan. (Taiyo International Inc., Edina, Minn., is the North American subsidiary.) "Compatible and non-reactive iron compounds are needed for fortification of foods as they have less of an 'iron taste' compared to soluble iron. However, due to insolubility issues, precipitation of such iron ingredients prevents fortification in large amounts.

"Using our proprietary 'Nutrition Delivery System,' which is a super-dispersion technology, we now offer product developers SunActive Fe™," Juneja adds. "SunActive Fe is a blend of ferric pyrophosphate, an insoluble iron ingredient, and unique emulsifiers and processing aids. It is readily dispersible in liquid formulations and produces no precipitation. The technology masks any disagreeable iron flavors without affecting the flavor of the final product."

SunActive Fe is generally recognized as safe (GRAS). When dispersed in water, it creates a clear to slightly milky white solution, not the usual brownish color of most other iron fortifying ingredients. It is stable against heat, salt, pH and oxidation, and is mild on the gastrointestinal system, providing a non-irritating iron fortification with superior absorption properties and bioavailability.

"Initial studies have shown SunActive Fe to improve the levels of hemoglobin and hematocrit values in human volunteers," Juneja says.

A recently completed human clinical trial conducted at the Institute of Food Science and Nutrition, Zurich, Switzerland, by Richard Hurrell and other researchers, compared iron absorption of SunActive Fe to that of ferrous sulfate in a stable isotope bioavailability study with infant cereal and a yogurt drink.

"Results indicate that SunActive Fe has the same bioavailability as ferrous sulfate in adult women," says Juneja.

Product developers in Japan and Europe are using SunActive Fe to formulate iron-fortified milk, yogurt and sports drinks. Such products generally contain about 1mg of iron per serving, which equates to 12.5mg of SunActive Fe per serving.

"Although the exact method for adding SunActive to a product depends on the specific formula, typically it is diluted with water (about one part SunActive Fe to 20 parts water), blended, homogenized and added to the product just prior to pasteurization," concludes Juneja.

Maeil Dairy Industry Co., Seoul, Korea, manufactures a line of iron-fortified milks targeted to very small children, "who need large amounts of iron for proper growth and development," says Wan-Sik Kim, mgr., R&D. "The brand is called Urie Growth milk. The First Milk variety contains 0.37mg/100ml, and the Growth Milk variety contains 0.42mg/100ml. This is 3-4 times the amount of iron in regular milk in Korea, which has 0.1 mg/100ml.

"The high absorption property of SunActive Fe allows us to make a label claim," Kim adds. "It also does not irritate the stomach, which is important for customer satisfaction." ■

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