Benefits of Iron/Folate Premix In Milk

Author: Johnny Thylin, Ph.D, MBA
Technical Director

Fortitech Europe ApS

According to a report in the African Journal of Food, Agriculture, Nutrition and Development, it is estimated that over 85 million people living on the African continent are iodine deficient. A further 180 million are at risk of iodine deficiency disorders. With iodized salt reaching about 70% of African households, these figures are presumably lower. With a focus on the prevention and control of micronutrient deficiencies, supplementation with vitamin A capsules has been successfully integrated into the National Immunization Days in 43 of 64 vitamin A-deficient countries. Iron/folate supplementation of pregnant women, which is government policy in almost all countries, has had very limited success.

Iron deficiency has many reported consequences with anemia being a major public health problem in Africa. It affects over 80% of women, infants and young children. Children who are iron deficient are more susceptible to upper respiratory tract infections, and it can have an adverse affect on their brain development, motor activity and their overall performance in school.

Folate, which is crucial for growing and building new cells, can be found naturally in leafy vegetables such as lettuce, peas, spinach and dried beans. Unfortunately, when they are cooked, they can loose almost half of their folic acid content. In addition to the crippling effects of folate deficiency in children, it can also increase the risk of colon cancer in adults, and increase the risk of a woman giving birth to a baby with neural tube defects. Low folate intakes also elevate plasma homocysteine, which has been shown to be a risk factor for cardiovascular disease. This is where fortification can play a crucial role in delivering the optimum iron/folate levels necessary for the body to properly function.

Because of the high acceptance rates and importance of dairy products in a healthy diet, milk could be an acceptable vehicle for folic acid fortification. However, differences in milk pasteurization processes, for example normal versus ultra-high temperature (UHT) pasteurization, can affect folate binding protein naturally found in milk. There is current debate about the role of folate binding protein in folate bioavailability.

To address these concerns, researchers in the Netherlands assessed folic acid bioavailability and folate binding protein concentration from fortified pasteurized milk and UHT milk. After a

4-week run-in period during which high folate foods were avoided, 69 healthy adults, aged 18-49 years old, were assigned to receive for 4 weeks one of four sources of milk — pasteurized milk, pasteurized milk fortified with 200 µg folic acid, UHT milk, or UHT milk fortified with 200 µg folic acid. The study found that pasteurized milk contained about 150 nmol folate binding protein per liter, but there was no immunologically detectable folate binding protein in the UHT milk. Folic acid bioavailability in the subjects was determined by comparing the change in serum and red blood cell folate and plasma homocysteine. Consumption of folic acid fortified milk caused a significant increase in serum and red blood cell folate and lowered plasma homocysteine. Notably, there was no significant difference in bioavailability of folic acid given with pasteurized or UHT milk. Moreover, recently concern has been raised about unmetabolized folic acid in the blood of subjects consuming high amounts for folic acid. The authors of the Dutch study reported that they could find no unmodified folic acid in the blood of subjects receiving folic acid fortified milk. This study is of interest because it demonstrates that milk is a suitable product for folic acid fortification. (*Reference: de Jong et al. (2005) European Journal of Clinical Nutrition 59: 906-913)*

When it comes to functional products, regardless of whether they are foods or beverages, response by mass markets proves that despite interest in eating for better health, the discriminating palate determines repeat purchase. Consumer interpretation of good taste involves many attributes including mouthfeel as well as the experience of bitter sweet, salt, sour, umami (savory) – and smell. This poses many challenges for food formulation worldwide. The integration of functional ingredients itself creates consumer acceptance issues by virtue of the nutrients' individual and interactive flavor notes.

To alleviate issues surrounding taste, a variety of possible solutions can be explored. These solutions center around flavoring or flavor maskants, microencapsulation, enteric coatings and selecting the appropriate market form of a particular ingredient to avoid potentially negative interactions. A manufacturer may also think to include an additional nutrient to increase the bioavailability of another nutrient. For example, combining vitamin C with iron increases the bioavailability of iron.

The key to optimizing the use of iron/folate in a delivery vehicle such as milk, or any dairy product, is a custom blended nutrient premix. And whether a manufacturer chooses to include one or more nutrients, the proper blending, testing and processing techniques can make the difference between producing a reliable, high quality, homogeneous, shelf-stable product or an inferior one that may cause poor consumer confidence, potential regulatory issues or recall situations.

Fortitech formulates custom nutrient premixes for the food, beverage and pharmaceutical industries. The company can formulate a custom premix incorporating iron/folic acid and dozens of other functional food ingredients in a wide array of applications. For more information, please visit www.fortitech.com. Information can also be requested via email through infoeurope@fortitech.com. The author can be contacted directly through thylin.johnny@fortitech.com