

Preventing oxidation is key to omega 3 formulation

6/22/2005 - Omega 3 is all the rage. Thanks to high profile media coverage and FDA approval of a health claim stating that long chain omega 3 fatty acids may reduce the risk of heart disease, consumers are gulping down just as much as the food companies can throw at them. *Jess Halliday* spoke to Martek's Srimi Vasan about successful formulation methods.

According to ProductScan, foods fortified with omega 3 are on track for 70 percent growth over 2004, with 109 new market entrants up until May 31 compared with 170 for the whole of last year.

But working with omega-3 still poses problems for formulators, since the fatty acid is highly susceptible to oxidation, which can affect the taste of the finished product. And consumers are unforgiving; if a fortified product does not match up to the unfortified version in smell, taste and texture, it will be roundly rejected.

At the Developing Functional Foods with Omega-3 conference in Amherst, MA, earlier this month, Srimi Vasan, principal scientist at Martek Biosciences, shared his advice on stabilization strategies.

The key challenge in formulating products with omega 3, he told NutraIngredients-USA.com, is sensitivity to iron and copper, catalysts to oxidation that are contained in even the cleanest water, foods and other ingredients.

There is a complex relationship between oxidation and sensory deterioration – and even when there are no detectable oxidation parameters, the taste of the finished product could be terrible.

"It is very difficult to predict how it will taste," said Vasan.

Also important is the initial quality of the raw material, although according to Vasan, this is a subjective issue since any scientific analysis would have to ensure that all oils tested had the same variables, such as age.

In general he said that the main difference between oils is algal versus fish origin.

"When dealing with nature, variability is always a huge factor," he said. *"The fish oil industry has done a good job of trying to minimize that, but it is easier with algae oil, in a controlled environment. That is reflected in the quality of the oil."*

Oxidation of omega 3s also depends on the matrix of the food to be fortified. For example, yogurt offers good protection, since the oil is emulsified and protected by a protein film. The gel-like structure also aids stabilization of the emulsion and minimizes the uptake and availability of oxygen.

As yogurt is stored in a refrigerator and has a relatively short shelf life (45 days), it is subjected to less overall stress.

Adding omega 3 to extruded cereal, however, poses more of a challenge since the production process involves high temperatures and it contains many minerals. Its large, porous surface area makes it more conducive to oxidative deterioration. And compared with yogurt, cereals have a long shelf life.

Vasan's advice to prevent oxidation occurring hinges on taking preventative measures as far back in the production process as possible.

"Add antioxidants as soon as possible," he said, *"and use them throughout the process. Don't put antioxidants in as a stabilizer at the end."*

He advocates introducing as many barriers to oxidation as are feasible, such as keeping the temperature low and working in an inert gas atmosphere. Both these factors affect chemical reaction, and for any 10-degree increase in temperature, the rate of reaction doubles, explained Vasan.

The use of proper packaging can provide further protection, depending on what is appropriate for the final food product. Ideally, it should act as a barrier not only to oxygen, but also to light and moisture, which can also trigger oxidization.

Vasan's final piece of advice was to take each fortified product on an individual basis, rather than expecting a one-way-fits-all approach to yield a successful product every time.

In each case, formulators should consider the source and supplier of the omega 3; the most appropriate form for the food, be it bulk oil, emulsion or microsphere; the appropriate fortification method; additional antioxidant protection; and appropriate packaging and storage.