

by Donald E. Pszczola

Fats: The Good, the Bad, and the In-Between

Fats have had a long and evolving history: the popular use of lard, the recommendations of margarine over butter, the fat-replacement craze of the early nineties when carbohydrate-based alternatives to fat were in the spotlight, the rapid transition away from *trans* fats, the rise of omega-3 fatty acids and other better-for you lipids, and renewed attention to the reduction of saturated fats were just a few of the milestones that could be identified along the lipid lane.

And even now fats are entering into a new—and somewhat complicated—chapter. It would be tempting, at this stage, to try to simplify the issues and say something about replacing less healthful fats with more healthful ones. But that would be too simple, although it has certainly become a common approach. Rather, it's more about trying to find a balance between the different kinds of fats. Or more precisely, those that have been dubbed “bad” vs those that are called “good.” And, especially as we consider lipid chemistry, those that are somewhere in between.

As part of a general philosophy of life, words such as “good” and “bad” are frequently oversimplifications in any case. But when talking about lipid chemistry—about fats and oils actually being made up of combinations of saturated and unsaturated fatty acids—they can be particularly misleading. And keep in mind that we're not just talking about nutritional profiles here. A fat may have the right properties in that respect, but may have stability issues or other functionality challenges to overcome. And so “good” may

profile or other functionality that otherwise would be lacking. This process can be used to rearrange fatty acids within an oil or in blends with other oils including fully hydrogenated or partially hydrogenated oils to produce a range of products with reduced *trans* levels or none. Furthermore, the sophisticated blending of different oils or fat fractions—and the increased functionality benefits this approach offers—add a new dimension to the perception of fats and oils as an ingredients category.

Through traditional breeding or advancements from biotechnology, compositional traits within a bean or seed can be enhanced to produce healthier oils with improved functionality characteristics. High-oleic oils—derived from sunflower, canola, soybean, and other plants—are being developed that can offer increased heat and oxidative stability compared to previous oils. Ingredient companies are forming collaborations to create next-generation plant-derived oils that provide long-chain omega-3s typically found in fish oil products.

And talk about in between: one development, a microalgae-derived ingredient described as an “algal

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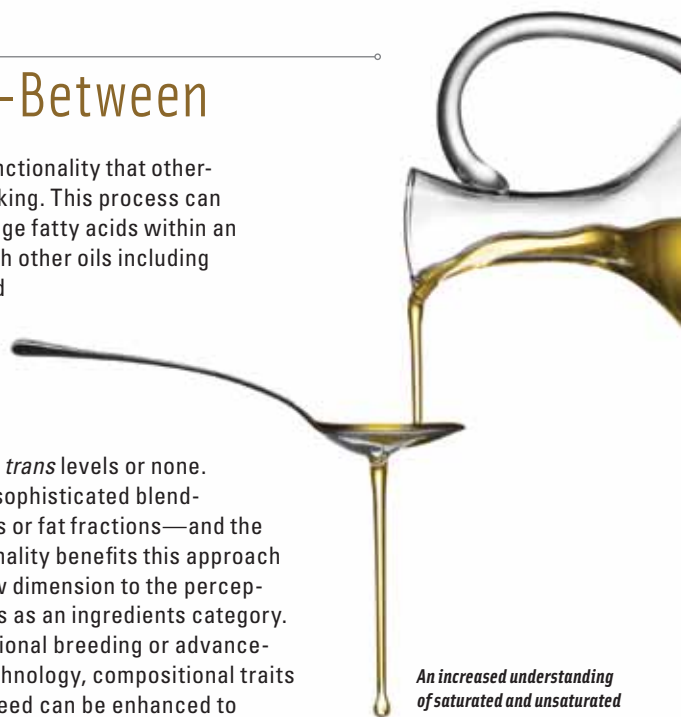
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become “bad” and “bad” may become “good.” Which is why, when talking about fats, words such as “bad” and “good” should probably be stricken from the vocabulary; the true answers, both from nutritional and functionality viewpoints, lie somewhere in between.

Formulators—and their ingredient suppliers—know this, of course, which is why there are so many exciting developments being created at this time. For example, techniques such as enzymatic interesterification can redesign the oil molecule, providing a desirable melting

flour” is not what you would call a traditional lipid, but it's not really a flour either. It contains more than 50% lipids and about one-third carbohydrates.

It's interesting but many compare bad fats vs good fats with the perception of good carbs vs bad carbs. But, at least in my opinion, this present stage of fat's evolution is actually more influenced by another ingredient area: that of the sweeteners and the synergistic blends that have been and are being created. As that earlier approach suggested, there is no one magic bullet, no



An increased understanding of saturated and unsaturated fatty acids will lead to the development—and subsequent pouring—of new lipid solutions.

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one sweetener that is necessarily better—from a health or functionality perspective—than another. Their “sweet” secret was in learning how they perform in a particular formula, especially in combination with each other. In the same way, I think the following developments will suggest that no one fat will offer a magic bullet, but rather when used together—saturated with unsaturated—can offer some very innovative solutions.

Saturate Sparing

The word “sparing” suggests an act marked by prudence and restraint in the use of a certain material. Following this definition, saturated fats might quickly come to mind. At least it did for Bunge Oils Inc., Bradley, Ill. (phone 815-523-3530, www.bungenorthamerica.com), when it developed its “saturate sparing” technology, part of the larger *UltraBlends* initiative.

Dilip K. Nakhasi, the company’s Director of Innovation, commented



Bakery products can take advantage of a line of shortenings and oils that use an enzymatic interesterification process that rearranges fatty acids to provide structure and functionality while eliminating trans fats and optimizing saturated fats. Photo courtesy of Bunge Oils

on the further advancements of the company’s *UltraBlends* line of bakery shortenings and oils. These products, which use an enzymatic interesterification process to rearrange fatty acids to provide structure and functionality at room temperature, are designed to eliminate *trans* fats and optimize saturated

fats while delivering a wider plasticity range. Latest additions to the line are *All-Purpose Bakery Shortening (Designer Solution 172)* and *Emulsified Bakery Shortening (Designer Solution 358)*. These two products use what is described as a “saturate sparing” technology, an approach that utilizes cellulose fibers

IngredientTalk:

I've heard it said that consumer perceptions regarding fats are undergoing a transformation as consumers gain a better understanding of the different kinds of fats and the sources from which they are derived. But how well do consumers really understand these differences? And are perceptions such as "good fat vs bad fat" beneficial in developing a healthier response? While many consumers recognize that it isn't just about eliminating or reducing fat in the diet (which is a definite step forward), there is still confusion and misperceptions that need to be better addressed by educational programs. If you care to add some weight on consumer perceptions regarding fats—and you're an IFT member—view www.ift.org, type in your name and password, click on the IFT community button, and go to the blog section. Hey, don't be lean with your opinions!

The Good News and Bad News about Fat Perceptions

According to the results from the 2011 *Consumer Attitudes About Nutrition* survey, an online poll of 1,000 adults conducted by the United Soybean Board, 53% of U.S. adults agreed that following a moderate-fat diet and choosing good fats over bad fats was an effective strategy for improving overall health, rather than adopting an overall low-fat diet by reducing all fat intake.

Well, the good news there is that consumers seem to be placing a greater emphasis on the type of fat that goes into food, and subsequent consumption, rather than the overall amount. However, the less-than-good news—at least in my opinion—is that despite their interest in choosing “good” fats over “bad” fats, most consumers have a difficult time pinpointing what exactly those healthier choices are. Again, according to the above-mentioned survey, “only 33% of

Americans recognize polyunsaturated fats as healthy, and 33% recognize monounsaturated fats accordingly.”

Another 2011 survey, this one conducted by the International Food Information Council, found that almost a fifth of consumers claimed to be trying to limit intakes of both polyunsaturated fat and monounsaturated fat.

Interestingly, (paradoxically might be a better word), heart-healthy omega-3 fatty acids remain the only type of fat that consumers rate more healthy than unhealthy, according to the United Soybean Board survey. And yet, if many consumers are still reducing their intakes of polyunsaturated fat (found in healthy fish oil, for example) or monounsaturated fat, what does that really say about their commitment to omega-3s? To add to the confusion, a consultancy, the Hartman Group, recently published its new report, *Looking Ahead: Food Culture 2012*, which stated that healthy fat was trending in while canola oil was trending out. Do I »»

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and triglyceride mismatch technology to develop functional plastic shortenings with reduced levels of saturated fatty acids.

“Bunge’s innovative approach of utilizing proprietary non-lipid ingredients and blending and crystallization processes (triglyceride mismatch) provides the capability of reducing saturated fatty acid levels to greater than 40% in all-purpose and emulsified shortening systems,” said Nakhasi. This technology is based on a special hard stock blend, which when combined with a fiber addition, enables the shortening system to trap and bind large amounts of free oil, while contributing structure.

“This technology successfully provides us the means to achieve functional shortenings with saturates at 17–19%,” continued Nakhasi. “Nutritional analysis indicates that the shortenings are virtually *trans* free with 40% reduced saturated fatty acids when compared to conventional reduced *trans* shortening.” Both ingredient solutions also increase monounsaturated fat and low linoleic content, further providing a healthier profile that appeals to health-conscious food processors.

Saturate sparing shortening can be used

in many all-purpose and emulsified shortening applications, he added. It can be utilized in place of other all-purpose shortenings to confer the nutritional benefits of reduced saturates without affecting the taste or mouthfeel of the finished product.

In addition to saturate sparing technology, Nakhasi also described the company’s growing interest in powdered nutritional lipids and ease of ingredient handling. Recently, it introduced *Delta Dry*, a powdered vegetable-based oil that may be used as a nutritional lipid component in healthy beverages and other mixes. Nakhasi explained that the ingredient consists of a core of *Delta SL* oil multilayered with soy or whey protein and hydrocolloids such as starch or gum arabic. (A randomized triacylglycerol blend of high-oleic canola oil and medium-chain triglycerides with added phytosterol esters, *Delta SL* is metabolized by the body more rapidly than traditional vegetable oils and inhibits the body’s ability to absorb cholesterol. These attributes combine to present a vegetable oil that helps maintain desired weight and can reduce low density lipoprotein cholesterol when used as a replacement for

IngredientTalk: (continued)

detect a contradiction here? Or, according to the same report, soy (a source of oil that is rich in omega-3s) is an out trend as well. Again, if so, what does that say again about consumer’s interest in (or understanding of) omega-3s? It kind of tells me that consumers are not always making the right connections, possibly because they’re still confused about what different oils really mean and how they influence their selection of healthier oils.

In addition to this consumer confusion about the selection of healthier fats, I have a few other concerns that can make the navigation of different fats from a consumer perspective difficult, to say the least.

A new trend report, *Fats and Oils: Culinary Trend Mapping Report*, released by the Center for Culinary Development and market research organization Packaged Facts, claims that consumers are beginning to understand that some fats are healthier than others, similar to the way that consumers became aware of good carbs vs bad

carbs. “Consumers are savvier than ever about the notion of good carbs and bad carbs,” said Kimberly Egan, CEO of the Center for Culinary Development. “We suspect that fats are coming next into the limelight, and the same ‘good fat, bad fat’ consumer filter will be applied.” The problem I have here is that I’m not sure that consumers taking that road, “good fats, bad fats” is necessarily a wise one.

To see fats that way is an over-simplification. Fats and oils are actually quite complex involving combinations of saturated and unsaturated fatty acids, with each providing certain nutritional and functionality properties. Trying to explain that to the consumer (after years in this job, I have to admit that I still have problems understanding lipid chemistry) would be a very interesting task. But while this task may be difficult, encouraging consumers to take a “good fat, bad fat” approach only moves them farther away from comprehension of the issues and not closer. In short, a “good fat, bad fat” approach may not be the best educational tool to use. »»

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traditional vegetable oils. *Delta Dry P/RB*, a structured lipid oil made from medium-chain triglycerides and canola oil but without phytosterol esters may also be used as a core for the powdered ingredient.)

A multilayered encapsulate, *Delta Dry* offers protein enhancement for healthy lipids as well as an ideal form for incorporation into powdered-based systems or other applications where liquid fats are not desirable, noted Nakhasi. The powdered nutritional lipid, which the company highlighted at 2011 SupplySide West, has 18 g of polyunsaturated fat per 100 g. Available as a free-flowing powder, it offers easy dispersibility and zero grams of *trans* fat per serving.

In October 2010, Bunge North America opened its Ingredient Innovations Center for Edible Oils and Carbohydrates in Bradley, Ill. This center combines the company's food ingredient innovation and pilot plant facilities into one location. The primary focus of the center is to provide applications support for existing products and customers, with the staff working to develop innovative

solutions to meet the customer's next-generation needs for shortenings and oils. The center includes a scaled-down version of an actual edible oil plant capable of creating shortenings, oils, and other products used by food manufacturers, bakeries, and restaurants. The center also has an extrusion pilot plant to test snack food and cereal applications made from milled grain products. And now, according to Nakhasi, Bunge is in the process of adding a state-of-the-art culinary center to the facility. This project is currently under construction and anticipated to be ready for unveiling later this year. So expect to see (and perhaps taste) a variety of dishes made with the ingredient innovations discussed here.

Swimming with the Fishes

You won't find this product in the sea, but a new canola innovation may provide the heart and brain health benefits that have been associated with oils produced from marine life, and as such, allow manufacturers the enticing use of qualified health claims. If so, then this oil—at least on a figurative level—may prove to swim

with the best fishes as it provides a plant-based source of important long-chain omega-3s typically not found in canola oil, as well as a competitive alternative to fish oil products.

Described as a next-generation canola oil, it is being developed through a partnership (or, more precisely, a "canola collaboration") between Cargill Inc., Minneapolis, Minn. (phone 952-742-9246, www.cargill.com), and BASF Plant Science. The product, which is expected to be available in the marketplace by 2020, will reportedly be rich in eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), two long-chain omega-3 polyunsaturated fatty acids traditionally found in oils derived from fish and algal sources.

In their partnership to develop this new oil, Cargill's food application capabilities and existing commercial relationships with major food manufacturers and foodservice operators are complemented with BASF's expertise in genetically enhancing EPA/DHA levels in canola oil and deregulating it for use in food products. "The combination of BASF's innovative

IngredientTalk: (continued)

Keep in mind that the 2010 Dietary Guidelines for Americans suggest that they consume only 10% of calories from saturated fatty acids by replacing them with MUFAs and PUFAs, and that we keep *trans* fatty acid consumption as low as possible. The good news is that the guidelines are emphasizing different types of fatty acids that can be consumed as opposed to just reducing the total amount of fat in the diet. The problem, as mentioned earlier, involves whether consumers really understand the difference between a MUFA and a PUFA or, for that matter, a saturated fat from a *trans* fat.

Another concern I have involves the word "moderate." When consumers are encouraged to follow a moderate-fat diet (one that chooses good fats over bad), what does that mean exactly? Perhaps I'm nitpicking here but as soon as you start choosing good fats over bad, you're not

really recommending a moderate position. A moderate fat diet, to me, means making use of both saturated and unsaturated fats in some kind of balance. Consumption of foods that make use of oil blends (combining the properties of different kinds of fat including saturated) would be part of a moderate-fat diet. Furthermore, judging by the obesity challenges we're currently faced with, consumers clearly have difficulty applying practices of moderation in any case, whether that involves reducing all fats in the diet or reducing only certain types.

On the other hand, you really can't blame the consumer on some of the issues. For example, some chefs are exploring the possibility of using traditional fats such as lard or duck fat in moderation. (I love the "in moderation" part.) They are doing this because such ingredients are gaining in popularity as consumers seek more flavorful, authentic fats. Without seeming dense, what exactly is a more authentic fat? And as opposed to

what? No wonder consumers can sometimes be confused. I know I am. And after all these years, you would think I would know better.

Well, anyway, all in all, I suppose there are some encouraging signs that consumers are viewing fats differently, but I still think there's a long way to go, and if the industry can do anything to lessen confusion, it would be in everyone's interests to do so. Remember, though, not too long ago the industry was advocating a wide range of carbohydrate-based fat alternatives. And today the view of "good fat vs bad fat" is frequently advocated—a position which is, in my opinion, just too simple. I think more attention needs to be paid to explaining how combinations of fats work and the value they provide in terms of functionality and nutritional value. I think that in the long run, such an approach is not only more honest but may help lessen the confusion of consumers. If you care to weigh in on consumer perceptions, let's IngredientTalk.

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technology and Cargill's leading position in the global supply chain for canola oil will make EPA/DHA canola oil-based products broadly accessible to consumers globally," said Marc Ehrhardt, Senior Vice President for BASF Plant Science.

The oil products generated by the alliance will address two key issues, shelf stability and cost—enabling food, pharmaceutical, and nutritional supplement manufacturers to deliver the potential health benefits of these omega-3 fatty acids to a variety of formulations.

"This partnership supports Cargill's objective of providing the healthiest oils to our customers and consumers globally," said Jenny Verner, President of Cargill Specialty Oils. She noted that this project builds on the company's existing product portfolio and will further extend its ability to help customers deliver the benefits of omega-3s in food products. Over the past couple of years, in particular, Cargill has introduced a number of canola oil innovations.

For example, at the 2011 IFT Food Expo, the company launched *Clear Valley*[®] 80, a natural, high-oleic canola oil characterized by its high oxidative stability, low levels of saturated fat, and zero

grams of *trans* fat per 14 g serving, superior oil functionality for processed foods, bland flavor, and extended storage and shelf life.

Unlike typical canola oil, which can develop off-notes when oxidized, high-oleic oils have natural resistance to oxidation without going through hydrogenation, fractionation, or other complex processing, noted Willie Loh, Vice President of Marketing, Cargill Oils & Shortenings. "With the highest level of oleic acid of all canola oils, and the highest level of oxidative stability among all high oleic oils on the market, *Clear Valley 80* canola oil is by far one of the most stable vegetable oils currently available, eliminating common flavor and shelf-life challenges often associated with formulating with healthier fats," said Loh.

Because the oil resists oxidation and the development of flavor off-notes, it allows food manufacturers to incorporate it successfully in a variety of applications including cereals, snacks, and baked products, added Loh. Furthermore, "its exceptional resistance to oxidation also can offer food manufacturers cost savings by providing an extended shelf life over other canola oils, and it may also allow customers

to switch to more environmentally friendly packaging and save on packaging film," noted Loh.

Linking Lipids

A broader portfolio of nutritional oils are offered by the Stepan Co., Maywood, N.J. (phone 201-712-7642, www.stepan.com), as a result of its acquisition of the *Clarino*[®], *Marino*[®], and *PinnoThin*[®] product lines of Lipid Nutrition B.V., formerly a part of IOI Loders Crokiaan Group. The acquired product lines were integrated into Stepan's Food and Health Specialties business, which was then renamed Stepan Lipid Nutrition.

"The Lipid Nutrition product lines combined with our *Neobee*[®] Medium-Chain Triglycerides products provides us with a unique portfolio of nutritional fats for the food, supplement, and nutrition industries," stated F. Quinn Stepan Jr., President and CEO of the Stepan Co. "The clinically proven benefits of these brands are of value to companies seeking to provide consumers with healthy and nutritional products."

Clarinol Conjugated Linoleic Acid, which for more than 10 years has been sold as a dietary supplement to reduce body fat and increase lean muscle mass, was approved

by FDA as GRAS for use in certain food products in 2008. *Marinol* concentrated omega-3 triglycerides are used in clinical and infant nutritional products to promote cardiovascular and neurological health. *PinnoThin*, derived from pine nuts, functions as an appetite suppressant. These acquired products will be manufactured at Stepan's Maywood, N.J., plant as well as at existing outside contract manufacturers for sale on a global basis.

Stepan and Lipid Nutrition recognized common market synergies and applied technologies within the field of nutritional oils. Stepan's primary markets are food, flavor, and infant formula, while Lipid Nutrition's strengths are in the dietary supplement market. The newly formed company will be a stronger supplier to all of these markets, bringing together product expertise, global customer reach, a stronger patent portfolio, and additional products for customers in markets that are experiencing high growth.

Stepan is a leading supplier of *Neobee* medium-chain triglycerides in the North American markets. MCTs are naturally derived healthy fat sources which deliver functional and nutritional benefits to

food systems. They are readily absorbed, low calorie, and non *trans* fat. Their special physical properties enable their utility as a solubilizer for flavors, colors, and bioactives, including beverage clouding and weighting agents. Primary applications are in infant formula, flavor carriers, and weight management and sports nutrition solutions.

With Lipid Nutrition having established a strong presence outside the U.S., the newly integrated company is expected to provide global market reach. The business management activities will be centralized in the existing Maywood facility, with a new European sales and operations team office located in the Netherlands.

Pioneering New Partnerships

2013. That's the year that Pioneer Hi-Bred, a DuPont business based in Johnston, Iowa (phone 515-727-7414, www.plenish.com), expects to market *Plenish*[™] high-oleic soybean oil for use by the food industry. Pioneer is collaborating with ADM in central Indiana, Bunge in Northwest Ohio, and Zeeland Farm Services in Michigan on contract production programs to produce in 2012 the high-oleic soybeans from which the oil will be derived. Although it's been



Oils produced from high-oleic soybeans show increased stability and provide a healthier alternative for use in food frying and processing applications.

Photo courtesy of Pioneer Hi-Bred

a long road, these "partnerships" are helping to bring the better-for-you oil closer to the market.

"We continue to see solid results in the field and strong interest from food companies looking for a soybean oil with consumer benefits and functionality," said Russ Sanders, Director of Enhanced Oils at Pioneer. "And with grower benefits such as yield and agronomics, our 2012 contract programs will allow growers and our partners to continue field testing and product development with *Plenish* high-oleic soybean oil."

FDA's completion of its review

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in 2009 and the USDA deregulation in June 2010 allows the high-oleic soybeans to be grown under contract in the U.S. The *Plenish* high-oleic soybean trait also is approved for cultivation in Canada and for import to Mexico, China, Australia, New Zealand, South Africa, Japan, and Korea. These markets represent more than 90% of U.S. soybean exports.

The high-oleic soybean provides a healthier oil alternative for food companies and foodservice operators and new market opportunities for soybean growers. According to the company, *Plenish* soybeans contain the highest oleic content (more than 75%) of any soybean product under commercial development. The high levels of oleic acid significantly increase the stability of the oil when used in frying and food processing applications. The oil provides greater flexibility in food applications, and can be used alone or in combination with other oils to optimize cost, functionality, and taste. The oil offers zero grams of *trans* fat per serving, 20% less saturated fat than commodity soybean oil, and a linolenic content of less than 3% for improved flavor and stability.

At the 2012 IFT Food Expo, Pioneer will showcase the functionality value and versatility of the oil in cooking demonstrations and samples featuring the healthier, stable oil. Benefits include higher heat stability for frying and longer fry life, improved flavor, increased shelf life for manufactured food products, decreased equipment maintenance due to less buildup, and blending opportunities. It can be used for deep frying, sautéing, grilling, baking, sauces, and dressings.

In tests with the oil, chefs and other members of the food industry have found many benefits, including its neutral, clean flavor; its ability to perform in a

broad range of applications; and its ability to perform under both extreme high and low temperatures. It was remarked that foods cooked in the oil had a crisper texture and no noticeable change in taste.

Not Your Run-of-the-Mill Flour

It's definitely not-your-run-of-the-mill flour. Or lipid, for that matter. A microalgae-derived ingredient, described as an "algal flour" by its developer, Solazyme Roquette Nutritionals, South San Francisco, Calif. (phone 650-243-5500, www.srnutrionals.com), contains more than 50% lipids (primarily monounsaturated fatty acids) and about one-third carbohydrates (polysaccharides, dietary fiber, and simple sugars), as well as protein, phospholipids, mono- and diglycerides, and micronutrients such as potassium, carotenoids, and B-vitamins. Because of this special composition, it can function as a better-for-you alternative to traditional lipids or as a natural emulsifier in the creation of fat- or calorie-reduced foods.

Whole Algalin Flour, marketed under the name *Algalin*[™], may be used to improve the nutritional (and label) value of a variety of products, including baked goods (see the April *Ingredients* section for a description of its use in cookies), ice cream and other frozen desserts, crackers, beverages, sauces, and salad dressings. According to the manufacturer, the ingredient can reduce fat by up to 75% and remove cholesterol; has a lipid profile similar to olive oil and can decrease the level of saturated fats and *trans* fats in a formulation; and can boost protein and natural fiber content. It may be used to reduce the use of eggs, milk, or butter in the

A microalgae-derived ingredient, described as an algal flour, can function as a better-for-you alternative to traditional lipids in the creation of a variety of fat-reduced foods and beverages. Photo courtesy of Solazyme Roquette Nutritionals



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product, and can allow formulators to introduce more non-allergenic, gluten-free, and vegan options.

In addition to its nutritional value, it can provide the manufacturer with functional benefits such as improved product stability and consistency. It can improve the fullness, richness, texture, and mouthfeel of foods; can serve as a natural emulsifier; and can increase the shelf life of bakery products. Finished products are said to be healthier without compromising flavor and sensory qualities. Prototypes compared favorably in consumer tests to full-fat counterparts.

The ingredient is available as a dry powder that is easily dispersible in water and incorporates well with other dry ingredients. It is made using a proprietary microalgae cultivation and preparation

method. A pure strain of microalgae is introduced into a clean, light-free stainless steel fermentation tank—not unlike those used in wine production—to convert photosynthetic plant sugars into oil.

Solazyme Roquette Nutritionals is the result of a joint venture formed between Solazyme, a leading California-based renewable oil and bioproducts company, and Roquette Freres, a global starch and starch-derivatives company headquartered in France, in November 2010. The venture combined Roquette's history and capabilities as a global food ingredient supplier with Solazyme's innovative microalgae-based technology.

Seeds of Inspiration

The search for new plant species that can provide omega-3 polyunsaturated fatty acids continues, and

some of these discoveries may lead to new and healthier oils. The latest of these products derived from what could be termed “seeds of inspiration” is a new plant-based source of omega-3 stearidonic acid (SDA)—*Ahiflower™* oil, which was developed by Technology Crops International, Winston-Salem, N.C. (phone 877-780-5906, www.ahiflower.com), as part of the company's *Nature's Crops* line of specialty oils. Isolated from the seeds of *Buglossoides arvensis*, the product reportedly contains up to 20% SDA, one of the highest natural plant sources of SDA known, as well as other fatty acids, including 5.3% gamma-linolenic acid, 38.8% alpha-linolenic acid (ALA), and 11.2% linoleic acid.

The seed oil's high levels of SDA convert more efficiently to EPA (eicosapentaenoic acid) than oils containing ALA. According to Keith

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Coupland, Director of the Centre for Lipid Research at the University of Hull in the United Kingdom, *Ahiflower* oil is a superior plant source of beneficial omega-3 because in the human body SDA converts to EPA at a rate up to five times that of alpha-linolenic acid (ALA). "Only about three percent of the ALA in flaxseed oil converts to EPA," he said, "while up to 30% of the SDA in *Ahiflower* oil converts to EPA." Furthermore, he continued, "one teaspoon of flaxseed oil contains 2,600 mg of ALA, which converts to approximately 80 mg EPA. By comparison, a teaspoon of *Ahiflower* oil contains 840 mg SDA and 1,800 mg ALA, which convert to approximately 300 mg EPA."

The primary source of EPA and DHA has traditionally come from fish oils, and the new plant-derived oil will be positioned as an alternative to oils derived from marine sources. Once commercialized, the new oil will have application in food products, nutritional supplements, nutraceuticals, and pharmaceuticals. Samples of the product are expected to be available later this year and commercial supplies are anticipated in 2013. The crop has not been genetically modified but developed through natural breeding techniques.

Technology Crops International is a global leader in the evaluation, development, commercialization, and delivery of new and high-value plant seed oils from crops such as high-erucic acid rapeseed, high-oleic sunflower, and echium. For example, in a partnership with Advanta, the company introduced *Nutrisun™* sunflower oil—a high-stearic, high-oleic "solid oil" that contains zero *trans* fats.

In July 2011, the company opened its state-of-the-art oilseed processing facility in Prince Edward Island, Canada. The new facility uses innovative and sustainable refining technologies to manufacture custom refined oils that meet industry specifications. In addition, the pilot plant and laboratory



Better-for-you omega-9 oil can be produced from sunflower seeds for use in mayonnaise, salad dressings, spreads, and retail bottled oils. The product, said to be the first saturated fat-free oil, has no trans fats and is high in monounsaturated fats. Photo copyright © iStockphoto.com/windujedi

facilities situated at the same location allow for product development, providing complete analytical and evaluation capabilities, and rigorous quality control procedures. The opening of the facility completes the first stage of the company's expansion in the region, enabling it to control the complete specialty crop supply chain—from seed evaluation to delivery of the processed oil.

Mayo Holds the Saturated Fat

In the near future, a better-for-you mayo can be formulated that will hold the saturated fats. This is made possible by an omega-9 sunflower oil from Dow AgroSciences, Indianapolis, Ind. (phone 317-337-4142, www.omega-9oils.com). The product is described as the first saturated fat-free oil, making it one of the healthiest oils. It also has zero *trans* fats and is high in heart-healthy monounsaturated fats.

Derived from *Nexera™* seeds, which were developed by the company through traditional plant breeding, the oil qualifies for a saturated fat-free claim. In addition to mayonnaise, other potential

applications include salad dressings, spreads, and retail bottled oils. The oil has no effect on taste or functionality, and is expected to appear on retail shelves and in product formulations in the next couple of years. Because the oil has a very high level of stability, many formulators will not require antioxidants or partial hydrogenation to achieve the desired shelf life.

Previously, the company developed omega-9 canola oil that increases the amount of monounsaturated and polyunsaturated fats while decreasing saturated and *trans* fat. In 2010, Indiana-based Weaver Popcorn Company Inc. reformulated its microwave popcorn products using this oil.

According to Dow AgroSciences, omega-9 oils are the next generation of healthier oils for both foodservice and food processing, and some of the biggest names in the food industry have already made the switch. Since 2006, use of omega-9 oils has resulted in the removal of 700 million pounds of *trans* fat and 300 million pounds of saturated fat from the North American diet. This has also saved nearly \$200 million for U.S. restaurants—nearly 100 million pounds less oil is used by the restaurant industry each year because of omega-9 oils, which last nearly 75% longer than previously used oils.

One Step Closer

In December 2011, USDA deregulated the biotech trait (MON 87705) in *Vistive® Gold* soybeans from Monsanto Company, St. Louis, Mo. (phone 314-694-2039, www.monsanto.com). The improved soybeans produce soybean oil with increased levels of monounsaturated fat while significantly lowering saturated fat.

"*Vistive Gold* soybeans are a breakthrough innovation that represents years of collaboration across the food supply chain," said Joe Cornelius, the company's Global Technology Lead for Food Quality Traits. "Monsanto worked closely with the food industry, health and nutrition communities, and agricultural sector to bring a biotechnology

trait with direct consumer benefit. The result, *Vistive Gold* soybeans, is one step closer to reality with the recent USDA deregulation.”

According to the company, the soybean oil will provide food companies an option to further reduce saturated fat and maintain zero *trans* fat in a range of food products. Compared to conventional soybean oil, it has 60% less saturated fat with significantly increased mono-unsaturated fat, leading to substantially improved oil stability. (The oil is also said to have 85% less saturated fat than palm oil and 70% less saturated fat than fry shortening.) Because of the increased stability, it does not have to be hydrogenated and therefore does not contain *trans* fat. With superior stability and flavor performance, the oil can be used for frying, topical applications, and oil blends.

The USDA deregulation completes the regulatory process in the U.S., allowing for field testing and seed production to take place within the U.S. The Food and Drug Administration completed the consultation process in January 2011. The trait has also been approved for use in Canada.

Balancing Function with Nutrition

Responding to industry demands, Loders Croklaan, Channahon, Ill. (phone 815-730-5200, www.croklaan.com), continues to develop and commercialize healthy products that eliminate *trans* fat and hydrogenation from foods while maintaining lower saturated fat levels in the finished product. Two of its latest innovations, which help customers develop products that are in line with the government’s Dietary Guidelines, were honored with an IFT 2011 Food Expo Innovation Award.

SansTrans™ VLS 30, an all-purpose shortening and emulsifier blend for use in baked goods, can reduce saturated fat content up to 30% without increasing cost. This *trans*-free, non-hydrogenated shortening consists of palm oil, canola oil, propyleneglycol mono and diesters of fats and fatty acids, and mono- and diglycerides.

SansTrans VLS 40 is an emulsified shortening that can offer bakery formulators the ability to reduce saturated fat up to 15% while reducing shortening costs. The *trans*-free, non-hydrogenated shortening consists of palm oil, propyleneglycol mono and diesters of fats and fatty acids, and mono and diglycerides.

Specially designed for cookie, cake, and muffin applications, both products are said to provide a clean taste, and their modest fat reduction does not alter the taste and texture of the finished products. In addition to their saturated fat reduction, they can improve the overall nutritional profile by reducing total fat and total calories from fat.

According to the company, the two new products demonstrate highly functional solutions while meeting the challenge of balancing function, nutrition, and cost optimization.

New Opportunities in Infant Nutrition

A new business division, Nutritional Lipids, has been formed by DSM Nutritional Products, Parsippany, N.J. (phone 800-526-0189, www.dsmnutritionalproducts.com), that integrates Martek’s algal DHA omega-3 and ARA omega-6 products into DSM’s polyunsaturated fatty acid portfolio.

With the newly created division, established in September 2011, DSM is able to

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utilize its global market reach, technology base, and application skill capabilities to channel and accelerate the growth of Martek's product portfolio into other regions, applications, and market segments beyond Martek's existing strong U.S.-based position in infant formula ingredients. By leveraging Martek's technology and market

position with DSM's global capabilities, marketing, and sales, the business division is expected to capture significant global growth opportunities and accelerate international expansion.

Several months earlier, DSM completed its acquisition of Martek Biosciences Corp. (its first major acquisition after its successful transformation into a Life Sciences and Materials Sciences company). As a result of the acquisition, DSM gained extensive new opportunities in the infant nutrition segment as well as food, beverages, and dietary supplements. The acquisition created a strong platform for DSM to enter the fast-growing omega-3 and omega-6 market through Martek's microbial DHA and ARA products, allowing DSM to become "a leading player in the field of microbial PUFAs."

Martek is a leader in the innovation, development, production, and sale of high-value products from microbial sources that promote health and wellness through nutrition. This technology platform has resulted in Martek's development of a number of products, including *life'sDHA*[™], a sustainable and vegetarian source of algal DHA important for brain, heart, and eye health throughout life and for use in infant formula, pregnancy and nursing products, foods and beverages, and dietary supplements.

The Nutritional Lipids division is based in Columbia, Md. Martek's former chief executive, Steve Dubin, will lead Nutritional Lipids as President.

Products from the Nutritional Lipids portfolio can be found in more than 400 brands of infant formula, nutritional supplements, and functional foods worldwide. Furthermore, new ingredients that were developed by Martek will also have a positive impact on the portfolio. For example, at the 2010 IFT Food Expo, a new DHA emulsion technology for shelf-stable beverages was introduced. The technology is able to successfully fortify juice drinks with *life'sDHA* with no impact on the final product's sensory characteristics.

Catches of the Day

Ultra-refined fish oil (*OmegaPure*[®]), rich in omega-3 fatty acids, EPA and DHA, may be used in a variety of formulations, as demonstrated by its manufacturer, Omega Protein Corp., Houston, Tex. (phone 713-623-0060, www.omegapure.com), which has collaborated with several ingredient companies to use the oil as a novel delivery system. These "catches of the day" are helping to extend the use of the oil, creating new opportunities for it and its health benefits.

For example, recently QualiTech Food

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Ingredients teamed up with the company to use the fish oil in a line of particulate inclusions, *Flavor-ettes*[™]. An alternative to costly, hard-to-handle fruits, these inclusions can be formulated with *OmegaPure* to enhance nutritional labeling. (Manufacturers need only list “menhaden fish oil”.) One hundred grams of *Flavor-ettes* are said to contain 10% of the oil. This provides 2,000 mg EPA and DHA, allowing manufacturers to easily achieve 50 mg EPA and DHA per food serving. The proprietary formulation is specifically designed for dry mix applications, and is available in sweet and savory varieties to add flavor, mouthfeel, and visual appeal to bakery, snack, cereal, and frozen products.

To provide additional systems, Omega Protein has also collaborated with Glanbia Nutritionals to bring *UltraGrad*[™], a blend of

flax (*MeadowPure*[®]) and fish oil (*OmegaPure*). This solution delivers all three types of omega-3 fatty acids (ALA, EPA, and DHA) in a dry ingredient that can be stored and transported at ambient temperatures. The free-flowing, easy-to-use ingredient provides stability and fortification without compromising the taste or aroma of the finished product. As little as 1.8 g of *UltraGrad* per serving provides sufficient omega-3s for a nutrient content claim. Potential applications include baked goods, bars, beverages, cereals, pasta, and soups and sauces.

A Healthier Doughnut?

A better-for-you doughnut? Many people, perhaps especially the police department, would be excited over that prospect.

Recently, Caravan Ingredients, Lenexa, Kansas (phone 800-669-4092,



An oil system innovation makes possible doughnuts with a reduction in saturated fat as well as zero grams of trans fat.

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More and more of tomorrow's products will reflect a greater use of mono- and polyunsaturated fats, including specialty oils. With health perspectives driving sales, it is important to address consumer confusion and dietary fat misperceptions. Photo courtesy of Pioneer Hi-Bred

www.caravaningredients.com), introduced a new application under the *Trancendim* line of high diglycerides: *Trancendim* oil for doughnut frying.

Doughnuts fried in oil systems utilizing the oil from Caravan can benefit from a nutritional panel with zero grams *trans* fat, a reduction in saturated fat, and the elimination of hydrogenation from the ingredient declaration.

Doughnuts fried with the oil are said to deliver a cleaner mouthfeel, helping doughnut producers' urge to indulge without compromising on taste or texture.

Healthier Margarines

Two new margarine products using canola oil are the latest additions from Canada-based Richardson Oilseed Ltd. (phone 204-934-5287, www.richardson.ca). These products, which are specifically formulated for baking, are significantly lower in saturated fat compared to high palm content alternatives.

Bake-It Sweet—a non-hydrogenated, all-purpose baking

margarine—is suitable for cookies, cakes, icings, crumble-style pie shells, and toppings. Its formulation allows for easy mixing applications.

Roll-It Margarine—a non-hydrogenated, premium, roll-in margarine—is ideal for croissants and Danish pastries. It has a heat-resistant flavor.

"These new margarines meet *trans* fat regulations and offer commercial bakers a healthier ingredient," said John Haen, the company's Vice President of Nutrition. "Our goal is to help food processors develop healthier products using canola oil to lower the saturated fat content, while preserving the good taste and functionality of their food products."

In the 'Lipid Light'

Fats and oils have been the subject of a number of recent trend reports. For example, according to *Food Flavors and Ingredients Outlook 2012*, a food trend outlook report from market research firm Packaged Facts, processed food manufacturers will introduce more products that reflect greater use of

mono- and polyunsaturated fats, including specialty oils. In another report, *Fats and Salad/Cooking Oils in the U.S.: Butter, Margarine, Olive Oil, and Beyond*, Packaged Facts estimates that U.S. retail sales of fats and oils reached nearly \$9.2 billion in 2011, up from \$8.2 billion in 2007. It projects that sales will reach \$10.6 billion by 2016, with annual growth rates of 2% in 2012, increasing by 3.5% by 2016.

Although health perspectives are driving sales, there is still consumer confusion as well as dietary fat misperceptions, which need to be addressed (see blog post beginning on page 82). The International Food Information Council has released new online resources on fats, aiming to provide further science-based information. And newsletters are being developed by various suppliers of fats and oils that are designed to educate.

Fats have had a long and evolving history—with a few interesting twists along the way. But one thing remains clear: Today, fats are definitely in the spotlight, or should I say more accurately, "lipid light," especially as a number of new specialty oils are under current development and will soon appear in the marketplace. **FT**

What are some of the emerging ingredients appearing on the horizon? Next month's Ingredients section will provide its annual round-up of these developments that may have an impact on future product formulating.



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