Following Functional Oils

Consumers are now realizing that not all fats are bad, and that some are even essential for proper nutrition. According to the United Soybean Board’s (USB) 15th Annual Consumer Attitudes about Nutrition report, consumers recognized olive oil (87%), flaxseed oil (71%), canola oil (70%), and soybean oil (68%) as the healthiest oils. Nutritional oils such as these have been reported to benefit skin, heart health, diabetes, and even weight management. Here’s a look at recent news regarding some of these oils.

Borage Oil
Borage oil is rich in gamma linolenic acid (GLA), an omega-6 fatty acid. Supplemental sources of GLA include evening primrose, borage, and black currant oil. Borage oil is traditionally used for its anti-inflammatory and anti-thrombotic properties. De Spirt et al. (2008) showed that dietary intervention with borage oil or flaxseed oil can benefit skin health. They gave subjects 2.2 g/day of borage oil, flaxseed oil, or a placebo for 12 weeks. Linoleic and GLA were the predominant fatty acids in borage oil, while α-linolenic acid (ALA) and linoleic acid (LA) were the major fatty acids in the flaxseed oil.

Compared to week 0, skin reddening was diminished and skin hydration was significantly increased in the subjects who took borage and flaxseed oil.

Canola Oil
Canola oil is high in unsaturated fats (93%), free of cholesterol and trans fatty acids, and low in saturated fat (7%). According to the Canola Council of Canada, Winnipeg, Manitoba, Canada (phone 204-982-2100, www.canola-council.org), clinical studies conducted over the past 20 years confirmed that when used as part of a balanced diet, canola oil has been shown to lower blood cholesterol levels and have a beneficial effect on clot formation, thereby decreasing the risk of heart disease and stroke.

In October 2006, the Food and Drug Administration ruled that canola oil is eligible to bear a qualified health claim for its ability to reduce the risk of coronary heart disease due to its unsaturated fat content. Recent innovations in canola oil include high oleic offerings as well as the development of an omega-3 canola oil. For example, Cargill, Minneapolis, Minn. (phone 800-227-4455, www.cargill.com), offers Clear Valley® high-oleic canola oil. The company recently opened The Cargill Specialty Canola Oils Research and Production Centre in Aberdeen, Saskatchewan. The company also recently expanded its Clear Valley line of high-oleic canola oil products to include

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Omega-9 oils, made from Nexera™ canola and sunflower seeds, available from Dow AgroSciences, Indianapolis, Ind. (phone 317-337-3000, www.dowagro.com), combine high-oleic (omega-9) (>70%) and low-linolenic (<3%) fatty acids. Omega-9 oils can deliver a zero trans fat and lower saturated fat claim on menus or labels. According to the company, the oils allow restaurants to reduce trans and saturated fats by 80%.

In May of 2008, Dow AgroSciences and Martek Biosciences Corp., Columbia, Md. (phone 410-740-0081, www.martek.com), forged an alliance to develop a docosahexaenoic acid (DHA) oil from canola. The cross-company team will work to apply an omega-3 producing gene from Martek’s microalgae to the omega-9 canola seed.

Fish Oil
Widely recognized among consumers, fish oil is rich in omega-3 fatty acids, predominantly DHA and eicosapentaenoic acid (EPA). A recent Fats of Life® newsletter (2008) summarized several findings that omega-3s in seafood protect the heart, eyes, and developing brain. In one study, more than 25,000 pregnant Danish women who consumed 3.5 servings of fish/week prior to delivery and who breastfed 8 mo or longer had children with higher total developmental scores at 18 mo of age compared with those who ate little fish and breastfed only 1 mo or less. Another study showed that elderly people who ate fatty fish weekly cut their risk of developing advanced age-related macular degeneration by 50% or more.

Becker et al. (2008) showed that consuming a combination of fish oil and red yeast rice, as well as making other lifestyle changes, matched the results of statins for reducing cholesterol. They randomized 74 subjects with hypercholesterolemia to an alternative treatment group (AG) or a group that received 40 mg of simvastatin/day for 12 weeks. The alternative treatment included therapeutic lifestyle changes and the ingestion of red yeast rice and fish oil supplements (2,106 mg of EPA/day and 1,680 mg of SHA/day) for 12 weeks. There was a statistically significant reduction in low density lipoprotein (LDL) cholesterol levels in both groups of subjects. Those in the AG also demonstrated significant reductions in triglycerides and weight compared with those who consumed the statin.

Flaxseed Oil
Flaxseed oil is 45–60% ALA and a good source of LA, an omega-6 fatty acid. Flaxseed has been used to treat high cholesterol and prevent cancer. It also has been shown to have anti-inflammatory abilities.

Paschos et al. (2007) examined the effect of increased ALA intake on blood pressure. They gave 59 dyslipidemic men 8 g of ALA-rich flaxseed oil/day for 12 weeks. The diet of the control group was supplemented with safflower oil that contained the equivalent levels of omega-6 fatty acid (11 g of LA/day). Supplementation with ALA resulted in significantly lower systolic and diastolic blood pressure levels compared with LA. The researchers concluded that they observed a hypotensive effect of ALA, which may constitute another mechanism for the apparent cardioprotective effect of ALA.

Hemp Oil
Hemp seed oil boasts high concentrations of omega-6 and omega-3 fatty acids in a ratio of 3:1. In addition to having high mono- and polyunsaturated-fat contents, hemp oil is naturally low in cholesterol, and the saturated-fat content represents only 9% of total calories. Hemp seed oil is also a source of GLA.

According to Manitoba Harvest, Winnipeg, Manitoba, Canada (phone 800-665-4387, www.manitobaharvest.com), hemp contains the phytosterols β-sitosterol, stigmasterol, and campesterol, which are known to reduce cholesterol. The company is a farmer-owned vertically integrated hemp food manufacturer that sells hemp foods and oils.

Olive Oil
Olive oil is an integral part of the Mediterranean diet, which has been linked to a lower risk of cardiovascular disease. Virgin olive oil contains the polyphenols hydroxytyrosol (HT) and hydroxytyrosol acetate (HT-AC). Gonzalez-Corréa et al. (2008) showed that the polyphenols reduced platelet aggregation in rats, ultimately benefiting heart health. They investigated the anti-platelet effect of HT and HT-AC in healthy rats and compared
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their effects to acetylsalicylic acid (ASA), a compound known to have beneficial effects in reducing platelet aggregation. All compounds were administered for seven days. HT and HT-AC inhibited platelet aggregation in whole blood, with a 50% inhibitory dose of 48.25 mg/kg of HT/day, 16.05 mg/kg of HT-AC/day, and 2.42 mg/kg of ASA/day.

In addition to heart health, Martínez-González et al. (2008) showed that virgin olive oil may also offer diabetes protection. The researchers assessed the relation between adherence to a Mediterranean diet and the incidence of diabetes among 13,380 healthy subjects without diabetes. After 4.4 years, the subjects who adhered closely to a Mediterranean diet had a lower risk of diabetes.

**Rice Bran Oil**

Rice bran oil is hypoallergenic and contains vitamin E and other micronutrients. According to NutraCea, Phoenix, Ariz. (phone 602-522-3000, www.nutracea.com), it is also a naturally occurring source of antioxidants such as tocochromanols, tocotrienols, gamma oryzanol, phytosterols, polyphenols, and squalene. In addition, because of its balance of saturated, monounsaturated, and polyunsaturated fats, rice bran oil is thought to contribute to the prevention of cardiovascular disease by improving serum cholesterol levels.

In June 2008, the company announced plans to construct a new rice bran oil refinery in China, which is expected to process 500,000 metric tons of raw rice bran annually.

**Soybean Oil**

Soybean oil is low in saturated fat and high in polyunsaturated fat, and it contains monounsaturated fat. While fish oil is the preferred source of omega-3s because of the bioavailability of EPA and DHA, the ALA in soybean oil is the principal source of omega-3s in the American diet. Information from USB (www.talksoy.com) says that soybean oil is also a source of alpha-tocopherol and contains a number of phytosterols, including β-sitosterol, campesterol, and stigmasterol. Soybean oil provides 327 mg of phytosterols/100 g.

Companies such as Kellogg and KFC have switched to using enhanced soybean oils (low-linolenic soybean oil) for improved product functionality, health, and nutrition. In addition, USB announced in December 2008 that the high-oleic soybean trait being developed by the Bunge DuPont Biotech Alliance is on track for limited introduction in 2009 pending regulatory approvals.

The high-oleic soybeans contain at least 80% oleic acid, significantly increasing the stability of the oil when used in frying and food processing. In addition to delivering at least 80% oleic acid, the high-oleic soybean oil trait has consistently demonstrated a LA content of less than 3%, and more than 20% less saturated fatty acid than commodity soybean oil.

According to Qualisoy (phone 206-270-4658, www.qualisoy.com), a collaborative effort within the soybean industry to help market the development and availability of trait-enhanced soybeans and soybean oil, there is more to come in enhanced soybean traits. Trait enhancements such as omega-3 and mid-oleic/low-saturated fat for the food industry are being developed.

**Sunflower Oil**

Sunflower oil is rich in vitamin E. It is a combination of monounsaturated and polyunsaturated fats with low saturated fat levels. According to the National Sunflower Association, Bismarck, N.D. (phone 701-328-5100, www.sunflowernsa.com), there are three types of sunflower oil available: NuSun®, linoleic, and high-oleic sunflower oil. All are developed with standard breeding techniques and differ in oleic levels with unique properties.

For example, Binkoski et al. (2005) evaluated the effects of NuSun oil on lipid and lipoprotein levels and oxidative stress in 12 men and 19 women with moderate hypercholesterolemia. The experimental diets consisted of 30% fat via olive oil or NuSun oil. The control diet was an average American diet (34% fat). The subjects consumed each diet for 4 weeks with a 2-week compliance break before crossing over to another diet. The NuSun diet decreased both total and LDL cholesterol levels compared with the average American diet and the olive oil diet. FT

References cited in this article are available from the author.