



NuSun[®] Sunflower Oil

Trans-Free Healthy Oil



NuSun Oil: the Natural Variety of Choice

NuSun[®] sunflower oil is a natural variety, mid-oleic oil that was introduced to the marketplace in 1999 to meet the changing needs of the food industry. United States Department of Agriculture researchers, hybrid seed companies, processors and sunflower growers have all been involved in the progress of NuSun. The advantages of NuSun have made it the preferable sunflower oil for use today. NuSun sunflower oil was developed by standard breeding techniques without using genetic modification and is therefore non-transgenic. The U.S. sunflower industry has converted the majority of acres to NuSun, and expansion into other regions is under way to insure consistent production to meet growing demand.

Recognizing the needs of the food industry and of health professionals for oil that would meet performance and health standards, sunflower possessed the genetic characteristics required to develop oil with a unique fat profile that would provide the necessary attributes for use in industrial cooking.

Below: With about 65% of its total fat content comprised of good monosaturated fat, and another 26% from good polyunsaturated fat, NuSun sunflower oil is a healthy choice. It contains less than 10% saturated fat.

NuSun oil contains less than 10% the bad saturated fat and over 90% of the healthy unsaturated fat. Approximately 65% of the healthy fat is monounsaturated and 26% is polyunsaturated. NuSun is considered a mid-oleic oil. Concentrations of linolenic acid — a fatty acid that contributes to instability — are less than 1% in NuSun.

This optimal balance of fats allows for excellent functionality and stability in cooking and frying. It's also consistent with current dietary fat recommendations that advise us to increase poly- and monounsaturated fats while keeping saturated and trans fats low. NuSun oil is low in saturated fat, is naturally trans fat-free, and does not require partial hydrogenation, making it a healthy choice over other oils.

NuSun Oil: Embraced by Manufacturers

NuSun sunflower oil provides stability for frying without the need for partial hydrogenation because it has a high amount of healthy monounsaturated fat. The natural stability in NuSun enhances product fry-life and shelf life. The oxidative stability of NuSun versus other oils is shown in Figure 2.

Below: NuSun, partially hydrogenated soy and palm are all stable oils, as these AOM values show. But NuSun is clearly the healthiest oil of the three.

Figure 1: Fatty Acid Profile of Oils

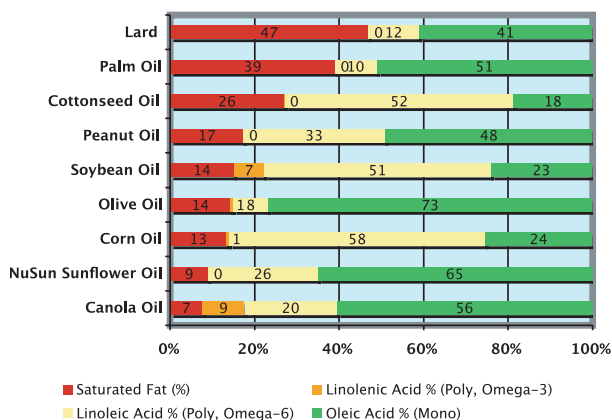
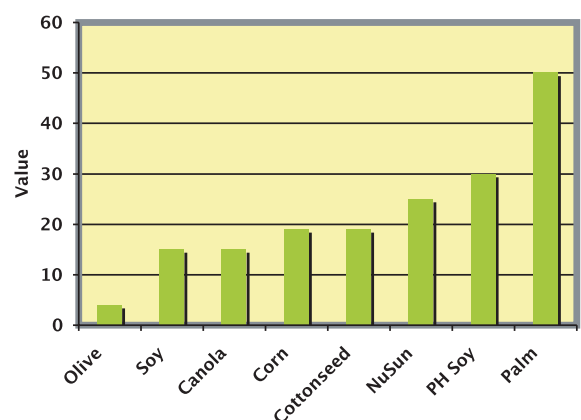


Figure 2: Oxidative Stability of Oils



Furthermore, when NuSun was compared to several different commercially available fry oils, it performed just as well as or better than the partially hydrogenated (PH) oils, and it was superior to soybean, canola, peanut, cottonseed and corn oil (1,2). In addition, NuSun exhibited less color formation during deep-frying.

NuSun works extremely well in commercial cooking and is being used successfully by major snack food manufacturers and in food service applications.

NuSun is appealing to customers because it provides a clean, light taste that allows the flavors of foods to shine through. NuSun oil has a smoke point of 450°, and it contains a good balance of linoleic acid, a polyunsaturated essential fatty acid that enhances the taste of products. In a frying test that compared hydrogenated soy oil to NuSun mid-oleic sunflower oil, potatoes fried in hydrogenated oil were described as waxy and fruity, whereas overall flavor quality scores were significantly better with potatoes fried in NuSun (2).

In addition, a study at the United States Department of Agriculture, conducted to optimize the frying quality and stability of sunflower oil, found that potato chips fried in the mid-oleic oil (NuSun) had significantly better initial flavor quality than chips fried in high-oleic sunflower oil (3). Mid-oleic NuSun oil has more linoleic acid than the high-oleic sunflower oil, and this balance proves to be an important contributor to the taste profile. Sunflower oils containing at least 20% linoleic acid, like NuSun, possess a positive deep-fried aroma and taste, contributing to all of the necessary characteristics for today's manufacturers.

NuSun Oil: A Healthy Trans-Free Alternative

NuSun sunflower oil provides manufacturers with the performance characteristics needed for commercial use and the demands of frying. It has a great taste and also delivers optimal health benefits because it is low in saturated fat and is trans fat-free.

Trans fats are formed during partial hydrogenation, a process that converts vegetable oils into semi-solid fats for use in commercial cooking, manufacturing processes and in margarines. These altered oils offer stability for deep-frying, and long shelf life; but they also contain trans fats, which have been described as resulting in “considerable potential harm, but no apparent benefit” to our health (4). Trans fats, like saturated fat, increase total and LDL cholesterol levels; but in addition, they reduce the good HDL cholesterol levels and increase triglycerides as compared with the intake of other fats (5).

The Food and Drug Administration now requires food manufacturers to list trans fat on Nutrition Facts panels. This ruling went into effect as of January 1, 2006, causing manufacturers to re-think the processing and nutritive value of their products.

The American Heart Association recognizes that the major food components that raise bad LDL cholesterol are saturated and trans fats. The 2005 Dietary Guidelines Advisory Committee suggests keeping trans fatty acids below 1% of total energy intake (6,7). The National Academy of Sciences also recommends limiting the amount of trans fat in the diet as much as possible.

Consumption Recommendations for “Bad” Fats

	Saturated Fat	Trans Fat
1. USDA / Health & Human Services Dietary Guidelines	10%; limit intake	below 1%
2. American Heart Association	10%; limit intake	limit intake
3. Nat'l Academy of Sciences / Inst. of Medicine Dietary Ref. Intakes	as low as possible	low as possible
4. Nat'l Cholesterol Education Program at Nat'l Inst. of Health	7%; keep intake low	keep intake low

A Recent Push to Get Trans Fat Out

A review paper published in the *New England Journal of Medicine* makes the case for rapid removal of trans fats from food service and processed food. The paper reviewed the best science showing that trans fats, which are prevalent in our current food supply, substantially increase the risk of cardiovascular disease and sudden cardiac death.

In addition, evidence in the review paper shows that trans fats can promote inflammation and other malfunctions at the cellular level, which may trigger the risk of chronic diseases. More than a quarter million coronary events every year are attributed to trans fat consumption (4). The paper suggests that if trans fats were replaced with oils free of partial hydrogenation, like NuSun, as much as 22% of coronary heart disease events in the U.S. could be averted.

The average consumption of trans fats in the U.S. diet is 2 to 3% of total calories consumed. About 80% of trans fat in the American diet comes from partially hydrogenated (PH) oils that are used in fried and snack foods. NuSun can replace PH oils in food service and the snack food industry because it is very stable. Switching to NuSun sunflower oil would allow manufacturers to reduce the amount of trans and saturated fat by over 90%. Figure 3 shows the benefits of using NuSun in chips versus PH oil. Saturated and trans fats are significantly reduced or eliminated.

The 2005 U.S. Dietary Guidelines say to “keep total fat between 20-35% of calories with most fats coming from sources of mono- and polyunsaturated fatty acids, such as fish, nuts, and vegetable oils.” NuSun is an optimally performing vegetable oil that will enhance the nutritional value of products and help meet this goal. Since NuSun is also trans fat-free, it can be used in food service as an ideal ingredient,

Figure 3: Bad Fat in Chips — PH Oil vs. NuSun

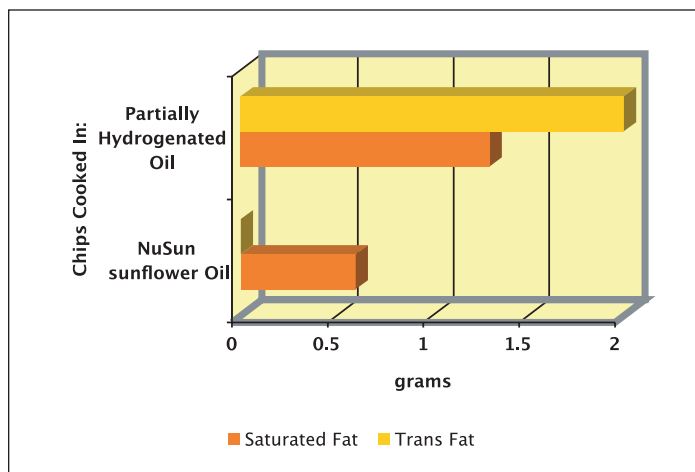
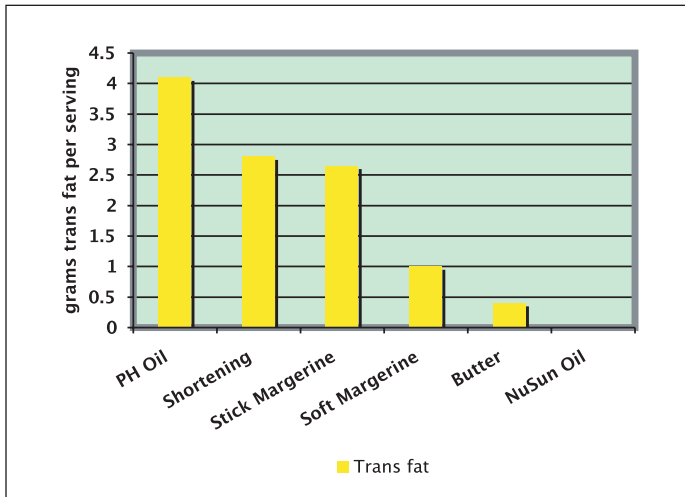


Figure 4: Trans Fat Per Serving



Above: With zero trans fat, NuSun sunflower oil carries an obvious health benefit over these other common cooking and ingredient options.

salad oil or stable frying oil. The amount of trans fats in various cooking and ingredient options is shown in Figure 4.

Evidence shows that adverse effects from trans fat consumption can result even at levels of intake as low as 1 to 3% of total energy intake, or approximately 2 to 7 g for a person consuming 2000 calories per day (4). A meta-analysis showed that a 2% increase in energy intake from trans fatty acids was associated with a 23% increase of coronary heart disease (8,9,10,11).

Estimates from the Harvard School of Public Health have shown that approximately 30,000 premature coronary heart disease deaths every year could be attributable to consumption of trans fatty acids, but that replacement of 2% of calories from trans fats with healthy unsaturated fats, like in NuSun, would reduce the risk of coronary heart disease by 53% (12,13). Using trans fat-free NuSun is a viable option to achieving better health.

Research on NuSun as a Preferred Healthy Oil

Research shows that including less saturated and trans fat in the diet and a higher proportion of unsaturated fat can lower risk of chronic diseases. Epidemiological studies have shown that for every 5% increase in monounsaturated fat, the risk of coronary heart disease is decreased by 24% (14,15).

Risk for coronary artery disease is reduced most effectively when saturated and trans fats are replaced with unsaturated fats, rather than carbohydrates (5). One clinical study showed that when saturated or trans fats are replaced with mono- or polyunsaturated fats from vegetable oils, bad LDL cholesterol and the bad-to-good (LDL/HDL) cholesterol ratio decrease (16).

As a result of the strong evidence related to type of fat intake, numerous clinical studies have been conducted to examine the specific health effects of consuming unsaturated fats. A study at Penn State showed that when mono- and polyunsaturated fats were used in place of carbohydrates or saturated fat, total and bad LDL cholesterol were decreased (17). Cardiovascular risk was reduced by 21% on the unsaturated diet compared to the average American diet.

Best Cholesterol-Lowering Diet Used NuSun

Penn State then conducted a controlled clinical study comparing NuSun to an average American diet or an olive oil diet. In the healthy oil diets, 2 tablespoons of oil low in saturated fat were substituted for saturated fats in foods such as salad dressings, granola and sauces. The study showed statistically significant reduction in total and bad LDL cholesterol with the NuSun diet compared to both the average American diet and the diet using olive oil as the fat source (18). Data are shown in Figure 5.

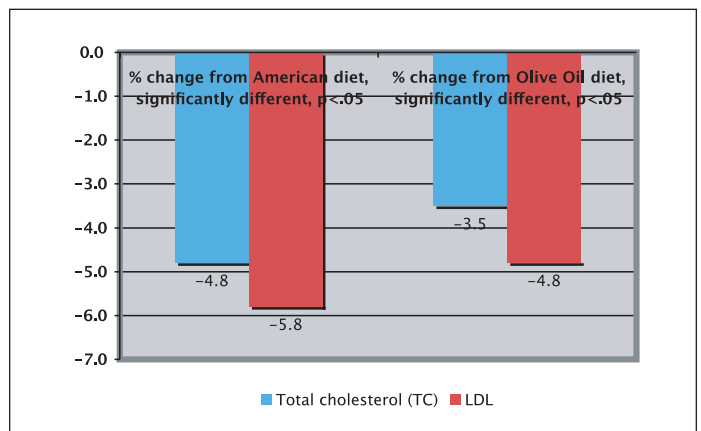
Dr. Penny Kris-Etherton, professor of nutrition and the study's director, said, "Within the context of a moderate fat diet, it is becoming clear that a mixture of unsaturated fatty acids provides the greatest health benefits."

In the paper, she concluded that substituting 2 tablespoons of NuSun sunflower oil daily in place of saturated fat lowered cholesterol more significantly than when substituting olive oil. In addition, the NuSun diet may have lowered total and bad LDL cholesterol levels more than the olive oil diet because NuSun sunflower oil is higher in polyunsaturated fat.

The small change of incorporating NuSun oil in the place of saturated fat can have great benefits on heart health. NuSun has a great fat profile, and its effects on cholesterol, as well as its functional characteristics, make it an easy solution for manufacturers and food service.

Below: In a Penn State study, the use of NuSun as a fat source resulted in a significant reduction in both total and bad LDL cholesterol, compared to an average American diet and a diet using olive oil as the fat source.

Figure 5: Percent Change of NuSun Diet From an American Diet or Olive Oil Diet

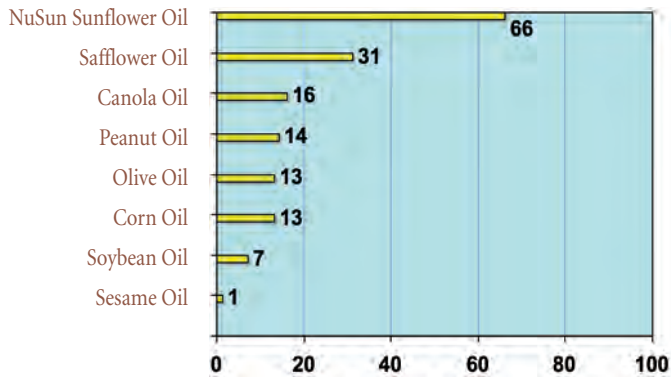


NuSun's "Cherry On Top": Vitamin E

Consumers, chefs, manufacturers and the food service industry have all been pleased with NuSun sunflower oil, which performs optimally in cooking applications. In addition, NuSun is full of heart-healthy fats that can improve our cardiovascular disease risk when consumed even in small amounts. To top it off, NuSun is the best source of vitamin E in the form of alpha-tocopherol, compared to leading oils.

Vitamin E is a required nutrient that functions as an antioxidant. Its consumption is associated with a reduced risk of chronic disease,

Figure 6: Vitamin E in Oils (% of RDA)**



**Recommended Dietary Allowance is 15 mg.

including heart disease, type 2 diabetes and hypertension. Most Americans do not meet the Recommended Daily Allowance (RDA) of vitamin E; in fact, only 5% of men and 4% of women meet the recommended goal of 15mg/d (19). A recent study found that in the U.S. diet, “to meet the RDA for vitamin E, at least 25% of total energy must come from fat (19).”

Sixty-six percent of the RDA for vitamin E can be met in one serving of NuSun oil. The great characteristics of NuSun offer the nutritional benefits and the versatility that is sought after today.

Advantages of NuSun Sunflower Oil

- Natural, non-transgenic
- Developed with standard breeding techniques
 - Low in saturated fat, less than 10%
 - Trans fat-free, no hydrogenation needed
 - High in healthy monounsaturated fat
- Provides linoleic acid (omega-6), an essential fatty acid
 - Excellent shelf stability
- Optimal performance for cooking and frying
 - High smoke point of 450°
 - Longer fry life
 - Tastes great
- Great source of vitamin E, one serving is 66% of RDA

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