

Transformations in the Food Industry: Reducing *Trans* Fat in the Diet

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The Dietary Guidelines for Americans 2005 were jointly announced on January 12, 2005, by the Departments of Health and Human Sciences (HHS) and Agriculture (USDA). These guidelines have been updated every five years since 1975 as a means for health, nutrition, and medical professionals to provide advice to Americans regarding the promotion of health and reducing the risk of chronic disease through nutrition and physical activity.

The Dietary Guidelines offer recommendations in several important areas including weight management, physical activity, food safety, and consumption of macronutrients (e.g., fat, carbohydrates, protein). Although dietary fat management is addressed in the Dietary Guidelines, this article will focus particularly on the current actions being taken by the food industry to reduce *trans* fat in the diet.

The Dietary Guidelines 2005 make the following recommendations on fat consumption: (1) consume less than 10% calories from saturated fats and less than 300 mg/d of cholesterol and keep *trans* fat consumption as low as possible; (2) keep total fat intake between 20–35% of calories (mostly poly- and monounsaturated fats); (3) make meat, poultry, dry bean, and milk product choices “lean,” “low fat,” or “fat free;” and (4) limit intakes of fats and oils high in saturated and/or *trans* fats.

In making its recommendations on dietary fat intake, the Dietary Guidelines authors reviewed many recent scientific documents and studies. One of the most often-quoted scientific references is the Institute of Medicine/National Academies of Science Report on Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids, published September 5, 2002. It states “most Americans need to decrease their intakes of saturated fat and *trans* fats, and many need to decrease their dietary intake of cholesterol.” The report further points out that the food industry has an important role in decreasing *trans* fat content in foods since about 80% are accounted for in foods containing partially hydrogenated oils while the remaining

20% are supplied by ruminant animals (i.e., beef and dairy products).

The reduction of *trans* fats in foods has been influenced by many factors. One major factor is the passage of a regulation by the Food and Drug Administration on July 11, 2003, which will require the inclusion of *trans* fats within the nutrition facts panel of the food label by January 1, 2006. The agency is also considering the use of nutrient content claims such as “*trans* fat free” and “reduced *trans* fat” to further guide consumers in their choice of foods.

The food industry is also assuming its responsibility to the American public by providing them with foods that are lower in *trans* fats which can fit into a daily diet. American consumers are becoming more health conscious and are increasingly interested in food products of improved healthfulness. Consumer advocacy groups have also called for the labeling of *trans* fats and their reduction in the diet.

The efforts by the food industry to reduce dietary *trans* fats have largely resulted in food manufacturers seeking reformulated food ingredients that are lower in or devoid of *trans* fat. Restaurants are similarly switching to deep frying oils or ingredients with reduced *trans* fat. Some retail food markets have even attempted to market only foods containing “low” or “no” *trans* fats.

There are many challenges that food manufacturers have faced during the development of new *trans* fat alter-

natives. Any replacement ingredient must provide the functional characteristics of the material being replaced. In other words, the alternative ingredient must provide the functionality of flakiness, firmness of texture, crispness, or desired appearance in the finished product in order to provide attributes desired by consumers. The stability or shelf life of the finished product must also be maintained to ensure consumer acceptability.

Another major factor involved in the development of *trans* fat alternatives is the assurance to purchasers that such products will be available in adequate commercial quantities. For example, a major restaurant chain must be

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assured that any new food product or frying medium will be available in sufficient quantities to satisfy anticipated demand. In some cases, this may mean very large commercial quantities. Similarly suppliers of *trans* fat alternatives (e.g., vegetable oils derived from oilseed varieties having unique fatty acid profiles) may require commitments from restaurant chains or food manufacturers to purchase sufficient amounts of the alternative ingredient to justify the major capital investment necessary to bring the alternative product to the marketplace. Newer oilseed varieties currently being considered for commercial development, particularly concentrating on oil of increased stability, thus having less need for partial hydrogenation, may take six to seven years to commercially develop.

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Most newer technologies required to develop many *trans* fat alternatives are very costly. These costs are ultimately passed on to consumers in the form of higher food prices. If foods become too expensive, consumers may not purchase them regardless of their nutritional value or functionality. Therefore the food industry is making every effort to minimize the cost of *trans* fat alternatives.

Another challenge to suppliers of *trans* fat alternatives is the logistics of physically providing them to end users. There is no single solution to solving food manufacturer needs in a variety of products. Multiple ingredient alternatives require multiple inventories and often times multiple suppliers. Also a major source of a *trans* fat alternative may be limited to only one or perhaps a few regional supply sources, placing major demands on supply systems attempting to service geographically diverse and numerous receivers of such products. Significant “lead time” may be required from the time of ordering to the time of delivery.

There are currently four main sources of *trans* fat alternatives: naturally stable oils/fats, interesterified oils/fats, “modified” partially hydrogenated oils, and trait-enhanced oils from newer oilseed varieties.

The more common oils or fats that are currently available and relatively stable, requiring little or no partial hydrogenation for most food product applications thus containing no *trans* fats include palm, corn, and cottonseed oils. Also used to a lesser extent are palm kernel, coconut, high oleic canola, high oleic safflower, mid and high oleic sunflower, and low linolenic soybean oils and animal fats

(e.g., beef tallow, lard).

A second source of low *trans* oils/fats for use as a shortening is a blend of oils and fats that have been interesterified. The interesterification process rearranges the fatty acids in a fat molecule resulting in customized melting characteristics.

A third method that may be used to reduce *trans* fats is by modifying the process of partial hydrogenation. Alteration of the variables influencing the hydrogenation process (e.g., time, temperature, catalyst) can result in a partially hydrogenated product of significantly reduced *trans* fat content.

The fourth method of reducing *trans* fats in the diet is to use oils from “trait enhanced” oilseed varieties specifically designed to have increased stability. These newer oilseed varieties are usually developed to have either lower amounts of relatively unstable fatty acids (e.g., linolenic) or higher amounts of more stable fatty acids (e.g. oleic). Such oilseed varieties currently available or soon to be introduced commercially include mid oleic sunflower and soybean, low linolenic soybean and canola, and high oleic sunflower and canola. Such varieties may be derived from either traditional plant breeding practices or biotechnological methods.

The search for oils that may be used in *trans* fat alternative products has had certain effects on the edible oils marketplace. Palm oil imports in 2003–04 were about 220,000 metric tons, in 2004–05 they were about 408,200 metric tons (375,000 in food use), and estimates are that about 600,000 metric tons will be imported in 2005–06 to meet market demand. Other relatively stable oils that will be available in commercial quantities in the future include low linolenic soybean (2005–2008), low linolenic, mid oleic soybean (2009–2012), high stearic soybean (2008–2012) and high stearic canola (2008–2012). Low linolenic acid soybeans are expected to be the next variety of significant consequence with about 80 million pounds of oil available by fall of 2005 and about 2 billion pounds available in 2008. The mid oleic soybean variety is expected to be commercially available in 2007 (40 million pounds) with an expected availability of 2 billion pounds by 2010.

In summary, the food industry has faced several major challenges in bringing to the marketplace acceptable food products that are lower in or free of *trans* fats. They include: (1) insuring the availability of *trans* fat replacements in adequate quantities to satisfy the marketplace, (2) achieving the functional characteristics of the product being replaced (i.e., texture, crispness, appearance, stability), (3) minimizing the costs of *trans* fat replacements, and (4) managing the logistics of preparing *trans* fat replacements (e.g., utilizing existing manufacturing facilities and delivering them efficiently to food processors). The food industry has been working diligently to meet these challenges in order to provide *trans* fat alternatives that will meet the objectives of the Dietary Guidelines 2005. A variety of such products are currently available in the marketplace and many others are on the horizon.

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