

03.06

White paper

Reducing trans fats for healthier frying

Executive Summary

A new U. S. Food and Drug Administration (FDA) consumer labeling law requiring disclosure of trans fats content on food packaging is driving public interest in foods with low or no trans fats. So far, restaurants, delis and other foodservice operations are not required to disclose trans fat content in the foods they prepare. However, consumers are being encouraged to ask about the presence of trans fats in prepared foods, particularly those that are deep fried in oil or shortening.

According to the FDA, Americans still consume four to five times as much saturated fat as trans fat in their diets. Both types of fatty acids are known to contribute to higher levels of LDL (bad) cholesterol in humans. Yet research has shown that trans fats also *lower* the amount of HDL (good) cholesterol, arguably making them more of a health threat. Most of the trans fats in the average diet are created during hydrogenation, a process developed to give healthier unsaturated oils such as soy, corn and canola some of the more desirable cooking properties of the saturated oils and animal fats they were designed to replace.

Some newer frying oils offer excellent performance with low or no trans fat content. Yet the initial expense of these costlier oils and the subsequent tendency to use them too long is having a negative impact on profits and product consistency.

Can foodservice operators afford to begin serving healthier fried foods?

The answer is yes. Frying oil is the most expensive component of any deep frying program. Proper oil management, including better oils, better frying and filtration practices and better equipment can significantly extend the life of all frying oils at optimal levels, thus reducing their absorption into food and offsetting initial higher costs of no trans fats oils. In addition, operators should consider the benefits of pressure frying, which requires lower frying temperatures and has been demonstrated to produce healthier fried foods by reducing the transfer of oils into food product during cooking.

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Introduction

On January 1st, 2006, a new consumer labeling law went into effect in the United States requiring food manufacturers to disclose the amount of trans fat in packaged food products. Trans fats have been in the news lately, partly as a result of industry moves to comply with this law but also because U. S. health, dietary and nutrition experts have found more and more reasons to believe that the widespread presence of trans fats in the nation's diet is the cause of significant long-term health problems in Americans.

What exactly are trans fats? Where do they come from? How bad are they? And what can the foodservice industry do to address these concerns?

Trans fats, produced mainly in the partial hydrogenation of vegetable oils, are now thought to be one of the prime culprits for elevated LDL—the bad fat of cholesterol that leads to heart disease—and reduced HDL, the “good” cholesterol. Among other purposes, partial hydrogenation is the principle means by which liquid vegetable oils are processed into more stable forms used in commercial frying.

Although the new labeling law does not apply to fresh food prepared in restaurants and delis, operators have cause for concern, particularly in the area of deep frying. Consumers are being encouraged to ask about the presence of trans fats in the food they order. Foodservice operators need to understand this issue and accept the responsibility of either serving healthier fried foods or being prepared to explain to the public why they do not. This white paper will provide some detail into the role of frying oils and processes in reducing trans fats in fried foods.

* * *

The story on trans fats

Trans fatty acids are essentially *processed fats*, the by-product of a common food manufacturing process known as hydrogenation. Trans fats are created when liquid vegetable oil is infused with hydrogen. This process creates a stiffer, “fat-like” oil that adds flavor stability, increases shelf life, and helps keep oil in a solid or semi-solid state for more convenient handling. Margarine and solid shortening are examples.

Trans fats creep into our diet when we eat foods prepared with or in partially hydrogenated vegetable oil. Crackers, cookies and many snack foods are typically made with partially hydrogenated vegetable oils. Concerns about the presence of trans fat in our diet are the result of the past five to 10 years of research demonstrating that trans fatty acids raise the levels of LDL (bad cholesterol) *and* inhibit the production of HDL (good cholesterol) in the bloodstream.

It is hard to call the issue controversial, although there is some disagreement over how bad certain food products and processes are compared to their alternatives. Moreover, fats consumed in moderation provide certain dietary benefits. They are the body’s main source of energy and are necessary for growth. They also contribute significantly to a food’s texture and flavor.

One reason for the hubbub is that these recent findings turn on its head decades of common consumer thinking about saturated fat replacements. Some studies suggest that while butter and lard (animal fats) are still bad for you, hard stick margarine and some partially hydrogenated cooking oils may be worse! Further complicating the issue is the fact that there is still a far higher percentage of saturated fat than trans fat in the average American diet.

The U. S. Food and Drug Administration (FDA) addresses the matter in this way:

“Americans consume on average 4-5 times as much saturated fat as trans fat in their diets. Trans fat, however, still provides a significant impact on the level of LDL in our diets.”

Fatty Acids 101

In order to better understand the health issues surrounding the current “trans fat” debate, it will help to learn a little bit about the chemistry of fatty acids in general.

Fatty acids are molecules containing varying numbers and arrangements of carbon, oxygen and hydrogen atoms. Most people are aware of the two main categories of fatty acids: saturated and unsaturated fats. It is actually more helpful to consider four main types of acids:

- Saturated fatty acids
- Monounsaturated fatty acids
- Polyunsaturated fatty acids
- Trans fatty acids

Saturated fatty acids contain as many hydrogen atoms as possible. As a result, there are no double bonds between carbon atoms in the molecule chain. Saturated fats are

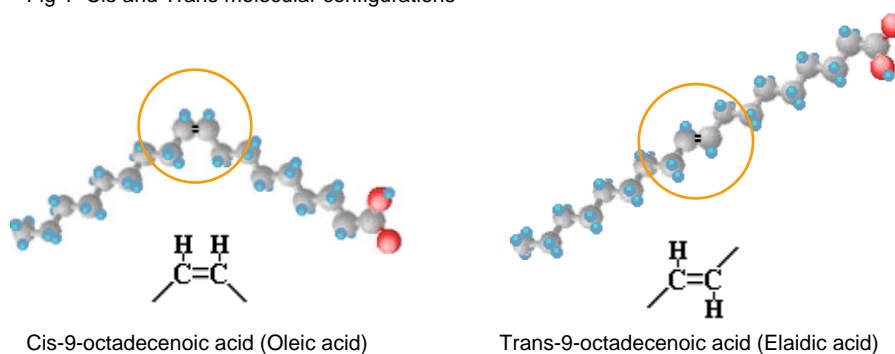
found mostly in animals and whole dairy products. Some plant oils, such as palm and coconut oil contain naturally occurring saturated fats.

A **monounsaturated fatty acid** has two fewer hydrogen atoms than the maximum, allowing for one (mono) carbon double bond to form (Fig 1.) Monounsaturated fats are found in peanut, canola and olive oil, and in many nuts.

A **polyunsaturated fatty acid** has still fewer hydrogen atoms, allowing *more* than one (poly) carbon double bond. Common sources of polyunsaturated fats are saffron, soy, sunflower, and corn oil, as well as fatty fish and walnuts.

Trans fatty acids are a specific type of unsaturated fatty acid in which carbon double bonds form with hydrogen atoms on opposing sides of the double bond, or “across” (trans) from each other (Fig 1.) Most naturally occurring unsaturated fats form carbon double bonds, with hydrogen atoms aligned on one side of the bond.

Fig 1 Cis and Trans molecular configurations



In a monounsaturated fatty acid (left,) hydrogen atoms bond to carbon atoms on the same side of the carbon-carbon double bond. In a trans fatty acid (right,) the hydrogen atoms bond on opposing sides of the carbon-carbon double bond. The projections above show how this difference changes the molecules' shape, which helps determines their physical properties.

Source: <http://www.scientificpsychic.com/fitness/fattyacids.html>

Although a small percentage of trans fatty acids occur naturally, the bulk of trans fats in the typical American diet are created when hydrogen is artificially introduced into polyunsaturated oils (partial hydrogenation.) The resulting changes in molecular structure produce some desirable characteristics of saturated fats but trans fatty acids are formed in the process.

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It's all about the food

The new nutritional labeling law won't eliminate trans fats from the national diet on its own, particularly since the average American ingests roughly a third of his or her calories away from home. According to a recent American Heart Association publication, most of the trans fat in a typical American diet comes from commercially baked and fried foods made with vegetable shortening, hard margarines or oils containing partially hydrogenated oils and fats. Such foods remain popular with consumers, however, and efforts to market low-fat or "heart-healthy" versions are usually well rewarded.

Most french fries, donuts, pastries, muffins, croissants, cookies, crackers, chips and other snack foods are high in trans fatty acids. In fact, nearly all fried or baked goods have some trans fats. The trans fat content of these foods may be as high as 45–50 percent of the fat.

<http://www.americanheart.org/presenter.jhtml?identifier=3030450>

What can restaurants and delis do?

The emergence of low and no-trans fat commercial cooking oils is probably the best opportunity for restaurants and delis serving deep fried foods to respond with a healthier product. Taking care of that oil, using fresh (not commercially frozen) foods, and cooking more foods in a pressure fryer are all ways to reduce the fat content in the final fried product. Here are a few things to consider when evaluating commercial frying oils.

- **The most common and economical oil is partially hydrogenated soybean oil.** Partially hydrogenated canola oil, canola oil, and non-hydrogenated peanut oil are also used in smaller quantities. Less common frying oils include safflower, cottonseed and sunflower oils.
- **Newer low to no trans fat oils** such as high oleic canola and low linolenic soybean exhibit good stability and frying properties without the need for hydrogenation.* These are currently being evaluated for frying by a number of restaurant chains.
- **Alternative oils generally cost more per pound**, mostly due to the economics of lower volume and the need to segregate during growing, transport, storage and processing. Some costs are likely to decrease over time as acceptance grows.
- **Flavor profiles can change** from oil to oil. Different oils have different indigenous flavors which can be imparted to foods. Differences are usually slight. Also, food flavor may be affected when switching to non-hydrogenated oils that are less stable if the discard cycle is not also adjusted.
- **Fresh foods fried in zero trans fat oils will be lower in trans fats.**† However, the percentage of absorption by food weight can vary enormously, depending on the type of food, quality of frying oil, temperature and pressure. As oil breaks down it is absorbed more easily. Frying under pressure is known to reduce oil absorption.

*Examples are *Amazing Fry NT™*, a corn oil & high-oleic canola oil blend, and *Nutra-Clear NT™* high oleic canola oil. Both products are offered by Bunge Oils, 1-800-828-0800 or www.bungeoils.com

[†] *Products fried in zero trans fat oils may still contain some trans fats. A small percentage of trans fats occur naturally in certain foods. In addition, the FDA permits a designation of “zero” for trans fat content below 0.5 grams per serving.*

Properties of cooking oils can vary widely. Industry experts suggest that restaurant frying oils are selected mainly for their durability. For this reason highly unsaturated oils such as canola oil are not popular because they break down more quickly. Healthier commercial options do exist, says Richard Stier, director of technical services at the Agriculture-Led Export Business in Cairo, Egypt. “Operators should look for oils with high oleic and/or low linoleic fatty acids to utilize a more healthful, more stable cooking oil that does not turn rancid as quickly.”

The downside to trans-fat free oils is that they usually cost more. Since cooking oil is the most expensive component of a fried food program, it is all that much more important to properly manage the handling of the oil in order to maximize its useful life.

Good oil management delays breakdown

Regardless of the type of frying oil in use, proper oil management will lower the cost of frying programs and improve the end product. Several factors contribute to the rate at which frying oil breaks down. These factors include cooking temperature, moisture, contaminants, and filtration media. Adopting the following cooking and cleaning practices will extend the life of your oil and help offset the cost of using a type of oil that is low in trans fats.

1. Do not fill fry baskets directly over hot oil. Crumbs and small particles will fall through the mesh basket and remain in the hot oil. This contributes to oil degradation and reduces the overall quality of the oil. Use a mesh skimmer to frequently remove particles and crumbs that remain in oil after removing baskets.
2. Do not cook at temperatures exceeding 360°F (182°C).
3. Reduce oil temperature to 280°F (127°C) during slow activity periods.
4. Do not season foods over the fryer. Salt, in particular, causes oil to deteriorate more rapidly.
5. Keep the fry pot filled to the required capacity.
6. Filter oil regularly. When preparing fresh breaded products filter the oil after every fourth load. If cooking smaller portions filtration can be extended to a minimum of once or twice per day.
7. When washing the fryer, filter components, baskets, etc., thoroughly remove all detergent and moisture before refilling with oil.
8. Cover fryers after shutdown to reduce oil contact with air and to keep foreign particles out of oil.

Older, degraded frying oil is also more easily absorbed into the food because much of its original molecular structure has broken into smaller components that combine readily with other substances. Keep in mind that the benefits of frying with healthier oils that break down faster will be lost if the oil is not filtered regularly and discarded on time.

* * *

The right equipment helps save on cooking oil expense

The better commercial fryers make it fast and easy to filter hot oil. [Henny Penny fryers](#), for example, all have built-in filtration systems that filter and refill hot oil in minutes at the touch of a button. Henny Penny fryers equipped with the Computron® 8000 control panel also offer several oil management features. These include automatic melt and idle modes designed to extend oil life and save energy, as well as optional Filter Enforcement that notifies users when to filter and can even be programmed to lock out operation unless filtration is actually performed.

Regular filtering helps prevent particulate matter and contaminants from breaking down cooking oil prematurely. But improvements in filter media—the porous materials through which oil is forced during the filter cycle—have resulted in filtration systems that reduce oil consumption by 40 percent. Henny Penny’s [SuperSorb® filter pads](#), for example, combine mechanical trapping and electrostatic retention to remove particles as small as .05 microns.

[Pressure frying](#) has long been considered the ideal way to cook fried chicken and many other deep fried menu items. It also results in products with less fat transferred from cooking oil. Frying at around 12 psi pressure builds a vapor barrier above the surface of the oil that allows products to cook a little faster at lower oil temperatures (Fig 2.) The additional pressure also helps seal in the food’s natural juices for better flavor, while sealing out most of the fat from cooking oil. Pressure frying is easier on cooking oil, too. Lower frying temperatures and less moisture escaping from food slow the rate of oil breakdown, thus giving it a longer useful life before discarding.

Fig 2 Henny Penny pressure fryer operation

Hinged lid locks down and forms pressurized seal over fry well. As food begins to cook, a small amount of moisture from food is released immediately, building pressure in the closed steam zone to 12 psi.

This pressurized cooking environment prevents further moisture from being released, sealing in food’s natural juices and locking oil out. Pressure also increases turbulence at lower temperatures for faster, more energy efficient cooking.

Rectangular fry pot promotes random turbulence and tumbling action, resulting in more even cooking. The “cold” zone below heating source allows cracklings to accumulate without scorching.

When filtration cycle is activated, used shortening drains through a disposable filter in the built-in filtration system. Switch-activated pump returns hot filtered shortening to fry pot for immediate use.



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Conclusion

Although trans fats—found mainly in partially hydrogenated food products—represent a much smaller percentage of total fat in the average diet than saturated fats, they may be more dangerous. Trans fatty acids have been shown to increase bad cholesterol and reduce good cholesterol in the blood stream, and consumers are getting concerned. The new U. S. labeling law will raise awareness even further as consumers begin to see what products contain trans fats and make substitutions or changes in their diet. This will carry over into restaurants and delis where the labeling laws do not apply. Instead, patrons will ask about cooking processes and oils used. Foodservice operators can respond positively with a simple two-step strategy for healthier deep frying: Switch to zero-trans fat cooking oils and adopt better cooking oil management practices that reduce annual oil consumption. Keys to better oil management are employee training, regular filtration, and superior filtration media. Also, consider the advantages of pressure frying for many popular items.

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For information on healthier deep frying, please contact: Tim Kasler, Henny Penny, (937) 456-8440, tkasler@hennypenny.com

Visit Henny Penny at www.hennypenny.com

Sources and background

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<http://heartdisease.about.com/cs/cholesterol/a/Transfat.htm?rd=1>

Background: Trans fatty acids, commercial oils, Bunge
<http://www.bunge.com/industry-information/trans-fatty-acids.html>

FDA Fact sheet “What Every Consumer Should Know About Trans Fatty Acids”
http://www.fda.gov/oc/initiatives/transfat/q_a.html

Additional information

U. S. FDA Fact Sheet What Every Consumer Should Know About Trans Fatty Acids July 9, 2003

Q: What ARE trans fatty acids?

A: Trans fatty acids (or “trans fat”) are fats found in foods such as vegetable shortening, some margarines, crackers, candies, baked goods, cookies, snack foods, fried foods, salad dressings, and many processed foods.

Q: Why should I care about trans fat?

A: It’s important to know about trans fat because there is a direct, proven relationship between diets high in trans fat content and LDL (“bad”) cholesterol levels and, therefore, an increased risk of coronary heart disease – a leading cause of death in the US.

Q: Aren’t ALL fats bad?

A: No. There are “good” fats and “bad” ones, just like there’s good and bad blood cholesterol. Saturated fats and trans fat have bad effects on cholesterol levels. Polyunsaturated fats and monounsaturated fats (such as olive oil, canola oil, soybean oil, and corn oil) have good effects.

Q: How much trans fat is too much?

A: There is research currently underway to determine this. However, it is true and accurate to say that the less saturated fat, trans fat and cholesterol consumed the better. Trans fat while pervasive in many of the foods we eat is not “essential” to any healthy diet.

Q: How can consumers know if a product contains trans fat if it’s not identified on the nutrition label?

A: Consumers can know if a food contains trans fat by looking at the ingredient list on the food label. If the ingredient list includes the words “shortening,” “partially hydrogenated vegetable oil” or “hydrogenated vegetable oil,” the food contains trans fat. Because ingredients are listed in descending order of predominance, smaller amounts are present when the ingredient is close to the end of the list.

Q: Do restaurants have to list the fat content of their foods?

A: No. But it’s a good tip to always ask which fats are being used to prepare the food you order.

Q: Why is it important to read labels?

A: Labels provide valuable information. An informed consumer is able to make better, healthier choices. So better labels make for smarter, healthier consumers.

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