Donut Frying Insights

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What to know when selecting a donut frying shortening and best practice tips for optimal frying performance

Frying oil is important to a donut. After frying, the oil makes up approximately 22% of the finished product. The frying oil determines the surface texture and color, the glaze adherence and the overall visual appeal over the shelf life of the donut. However oil options are not a one-size-fits-all proposition. It depends on the personal preferences of the donut maker, required shelf life and packaging.

Donut attributes most dependent on oil selection:

- **Color:** Some oils will brown the donut exterior more quickly than others.
- **External texture/mouthfeel:** Either oily, dry or waxy.
- **Oils weeping:** Can create greasy mouthfeel and/or unappealing visual.
- **Adherence of glazes or powdered sugar:** If too greasy, toppings will be absorbed or not stick to the surface of the donut.

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The pros and cons of different frying oils for donuts

Liquid oil

While liquid oils, like canola and soybean, are great for French fries, they don't work as well for donuts. Soybean or canola oil can be OK for donuts that will be eaten immediately, but after a few hours, they will be greasy and any toppings will have either been absorbed or fallen off. Frying oils that are solid at room temperature (i.e., shortenings) have a higher level of saturated fats, which aid in the oil setting up on the donut and provide a firm surface that will accommodate glazes and toppings.

PROS	CONS
Inexpensive	Low saturates means that the oil doesn't set up on the surface
Easy fryer management	Greasy texture occurs within a short time period
Readily available	Short fry life
Works well for donuts to be consumed immediately	Not ideal for donuts that will be consumed hours or days after frying

Palm oil and palm oil blends

Palm oil is the basic work horse of donut frying since partially hydrogenated oils have been banned. The saturated fat content in palm oil contributes to the oil setting up on the donut surface, which helps the adhesion of powdered sugar, glazes or other toppings. Palm oil can be blended with liquid oil or other hard fats or be interesterified to create or enhance functional attributes, such as adjusted melt points, change flavor profile or alter crystallization.

PROS	CONS
Sets up well on the donut surface to support glazes and powdered sugar	Can vary in cost, especially among palm oil blends
Long fry life	Consumers may have negative perceptions of palm oil related to sustainability concerns
Formulations that blend palm oil with other oils (e.g., canola, cottonseed, etc.) tend to have a cleaner flavor than a palm only shortening	Some palm oil formulations can impart a "palmy" flavor
	Can be high in saturated fats
	Some formulations may be slow to set up or crystallize

Interesterified soybean oil

Interesterified soybean oil is a good alternative to palm oil for a donut maker looking for a domestically sourced oil or for something with a different flavor profile.

PROS	CONS
Generally imparts a clean flavor	Some soybean-based products may impart beany notes
Domestic oil source	Some products may produce a waxy texture on the donut surface
A non-palm option	Having the term interesterified or hydrogenated on the label may not suit some donut makers
Results in lighter colored donuts compared to palm oil	

Animal fats: lard and tallow

Lard and tallow are the traditional fats for frying donuts. Their high saturated fat content sets nicely on the donut surface to produce a “dry” donut that holds for a length of time. However, they tend to impart a “beefy” or “savory” flavor profile.

PROS	CONS
High saturated fat content is conducive to a firm set up on the donut surface	Can impart a “beefy” or “savory” flavor
Sets up well on the donut surface to support glazes and powdered sugar	Higher in cholesterol than palm oil or other vegetable oils
Long fry life	

Frying best practices

Since oil is a primary component of a finished donut, the oil performance in the fryer is very important. Three things to keep in mind are:

1. Temperature of the frying oil
2. Proper oil level in the fryer
3. Oil quality over the frying period

Temperature

Oil temperature plays an important role in the development of the donut crust as well as ensuring it is properly cooked. Frying oil that is too hot can cause the surface crust to form prematurely, which can inhibit the donut from expanding and result in a denser donut. It also may darken the exterior of the donut too quickly and the cooking of the dough may be uneven. A temperature that is too high also increases the rate that the shortening breaks down in the fryer leading to off-flavors, smoking oil, polymerization in the fryer and inconsistent donuts. If the temperature is too low, the crust of the donut does not set quickly enough and excessive oil is absorbed into the donut. Low temperature will also slow down production time, lowering the overall output of finished products.

Oil Level

Improper oil level in the fryer also affects donut appearance and production. During the donut frying process, a lot of oil is absorbed into the donut as well as out the conveyor. This means the oil level is constantly changing. Proper oil management and top off are important. Not enough oil in the fryer can lead to a poorly formed crust, misshapen donuts and lower production. Too much oil is a safety issue—excessive oil splatter can cause slips or burns.

Oil Quality

When crumbs or small pieces of donuts are left in the oil, they continue to breakdown forming off-flavors and contributing to the deterioration of the oil. It is also important to have proper ventilation above the fryer to remove volatized compounds, which also contribute to breakdown of the oil quality. Monitoring the oil quality throughout the frying period is important to the outcome of the finished product. There are several tests that can be used, which include free fatty acid, color and total polar material tests. While old oil can negatively affect donuts, so can new oil. Fresh oil needs an initial break in period for optimal frying quality.

Donut Trends

While the traditional yeast-raised or cake donut is still a crowd-pleaser, new flavors, toppings and mashups have made donuts more than a breakfast treat. These new premium and indulgent donuts have made some donut shops destination places and have even been placed on the dessert menus of fine dining restaurants. Gourmet toppings and eye-popping colors also make donuts social media worthy. Another driver of donut sales is their portability—they are the perfect on-the-go treat.

Cargill's expertise and product portfolio.

At the Cargill Food Innovation Center, our fry lab includes a donut frying station to allow our application technicians to study and evaluate donut frying performance. Our experts in frying and baking applications provide our customers with insights on how to optimize their operations or problem solve product development issues. They also develop new shortening products that work in different ways to suit a variety of donut operations.

Product	Ingredient Statement	Typical Data	SAP#	Pack Size
Regal™ Donut Fry Shortening	Palm oil, soybean oil, hydrogenated cottonseed oil	Mettler Dropping Pt 45-50.5°C SFC at 21.1°C: 29-35 SFC at 40°C: 7.5-13.5	110015218 110029294	Bulk 50 lb cube
Advantage® PS-119 Donut Fry Shortening	Palm oil and soybean oil	Mettler Dropping Pt 113-125°F SFC at 21.1°C: 31.5-38.5 SFC at 40°C: 10-15	100086185	Bulk
Regal™ All- Purpose Shortening	Interesterified soybean oil	Mettler Dropping Pt 114-125°F SFC at 21.1°C: 21-30 SFC at 40°C: 4-10	100087757 100086790	Bulk 50 lb cube
Advantage® P-100	Palm Oil	Mettler Dropping Pt 96-110°F SFC at 21.1°C: 20 SFC at 37.8°C: 8	100085420 100087067	Bulk 50 lb cube
Advantage® P-115	Palm oil	Mettler Dropping Pt 109-120°F SFC at 21.1°C: 29-31 SFC at 37.8°C: 6-14	100085860 100087314	Bulk 50 lb cube
Advantage® P-118	Palm oil	Mettler Dropping Pt 116-124°F SFC at 21.1°C: 35-41 SFC at 37.8°C: 10-16	100085940	Bulk