

California Dried Plum Board

Technical Bulletin

July, 2006

California Dried Plums...Natural Alternative To Reduce Trans Fat in Baked Goods

Background

The move by the U. S. Food and Drug Administration (FDA) to label the amount of trans fatty acids in foods and minimize or eliminate trans fatty acids is scheduled to be implemented by 2006. Significant evidence suggests that the consumption of trans fatty acids is hazardous to human health even more so than animal and vegetable based saturated fats on an equal consumption basis. Although studies linking trans fat consumption and coronary heart disease vary, they still point to the same outcome of increased cholesterol. Further, what differentiates trans fats from saturated animal and tropical fats is a single physiological function: They not only increase total cholesterol but also have been shown to decrease HDL, thus upsetting the LDL/HDL ratio that is so critical to good heart health.

Trans fats naturally occur in meat and dairy products, though this isn't where American over-consumption of trans fats originates. Trans fats pervade many of the snack and baked goods categories that are of greatest concern to nutritionists and the FDA.

Trans fats increased in the diet when the food industry responded to the health community's call to reduce saturated fats in prepared foods. Without hydrogenation, manufacturers found that most vegetable-based fats and oils spoil quicker than saturated fats, could not withstand the high heat used in deep fryers, and made the batter and/or dough of many baked products runny.

Trans fats contribute to the taste, texture and shelf life of many of these foods. Some liquid shortening's are already on the market without trans fatty acids. The focus of this technical bulletin, however, is solid shortening that is frequently used in baked goods such as cakes, cookies and other sweet goods.

Baker's Dilemma

Flavor and texture delivery tends to dominate the bakery R&D decision to move from hydrogenated oils to trans free. From a flavor standpoint, there is the need for more subtle fat or butter flavors indicative of baked goods. The functionality of solid shortening is also highly correlated with texture in baked goods and will influence any decisions to modify or eliminate a trans fat alternative.

Fats and oils in baked goods make the crumb in cakes soft and easy to chew. Fats and oils also provide lubrication and moistness during manufacturing and consumption as well as pliability, rise, flakiness, strength and airiness during product manufacturing.

Lipid technology has been responsive to some of the needs of food processors to remove or reduce the level of trans fatty acids. Bakers, however, have a more difficult challenge that has not been seen since 1994 when the FDA implemented the current food labeling laws and prompted the fat-free craze. Those new labeling requirements resulted in the disclosure of the fat and calories from fat content of foods including baked goods. This came at a time when fat reduction was being demanded by consumers and actively promoted by food processors.

Fortunately, now as then, dried plums are available as an effective, natural alternative for bakers to consider in order to achieve fat reduction, trans fat reduction or elimination, as well as the reduction of total calories and calories from fat.

Dried Plum's Natural Components

What makes California dried plums so effective as a bakery ingredient? Naturally occurring components:

- 7.5% fiber that attracts moisture in baked goods
- 15% sorbitol that holds moisture in baked goods and extends shelf-life
- Reducing sugars such as glucose and fructose that also contribute moisture retention and natural sweetness
- 1.5% malic acid that potentiates flavors, particularly in fat-reduced baked goods, and also inhibits mold development thus extending shelf-life
- The above in combination creates a "natural fruit system" responsible for dried plum's fat-sparing capabilities

Dried Plum's Reduce Total Fat And Trans Fat

Bakers use shortening for several reasons. Among the most important are air entrapment during the sugar/shortening or "creaming" stages and the maintenance of a tender and moist texture in the finished product. Dried plums contain a unique blend of both soluble and insoluble pectins which help to form a stable film around air and leavening gas during mixing and bench time to function in a manner similar to shortening.

Dried plums also contain a high level of naturally occurring sorbitol. Sorbitol is one of the most effective humectants known and thus helps to keep the finished product soft and moist over an extended shelf life.

Fat is a principal carrier of flavor in baked goods. Fat coats the inside of the mouth to maximize the flavor delivery of baked goods. Dried plums contain malic acid, which has been shown to be an effective flavor enhancer. Malic acid is released more slowly than other organic acids and thus has a greater flavor carry-through during the chewing process. Additionally, malic acid helps to inhibit microbial spoilage and can also serve as the natural acid component in chemical leavening systems.

Thus, it is possible to replace a portion of the butter, shortening or oil in bakery formulas using dried plums with little or no noticeable change in the sensory characteristics of the end product. With proper fine-tuning, reduced-fat baked goods using dried plums are actually preferred over full-fat alternatives.

Dried Plum's Reduce Calories

Dried plums contain 2.57 calories per gram. Shortening, on-the-other-hand, contains 8.84 calories per gram. Replacing all or a portion of the shortening in a bakery formula not only reduces the total fat and trans fat content of the finished baked good but the calories as well.

For example, if 100% of the shortening in a bakery formula is replaced with dried plum puree, the calories are reduced 85%. If 50% of the shortening is replaced with dried plum puree, the calories are reduced by 43%. This calorie replacement is possible due to dried plum's high sugar content, i.e., over half the composition of dried plum puree is a combination of reducing sugars and sorbitol.

Not only are calories reduced, but dried plums can also help to reduce sodium levels by as much as 99% if all of the shortening is substituted with dried plum puree and by 50% if half the shortening is substituted with dried plum puree.

Still further, important nutrients such as calcium, iron, potassium, Vitamins A and C and niacin are added when dried plum puree is used to replace shortening. For bakers seeking natural ingredients to satisfy consumer demand for nutritionally enhanced bakery products without any loss of flavor and other sensory characteristics, dried plums is a perfect solution.

Dried Plums To The Rescue

Many bakery applications rely, at least in part, on the shortening component contributed by saturated fats, trans fats or a combination of both. These fats

provide structure, aeration, creaming and mouthfeel. And, they form the technical hurdle to any reformulation efforts.

Dried plums function just like shortening in baked goods. Best results are achieved by following a few simple steps:

- Begin by removing half of the added shortening and substitute one-half of the volume or weight of shortening called for with dried plum purees or powders. Further adjustments can be made to achieve desired fat levels and acceptable sensory objectives.
- Added sugar can be reduced slightly due to dried plums natural sugar content.
- As dried plums are acidic, bakery products may benefit from adding a small amount of baking soda in addition to that normally used.
- Total mixing time is significantly less because creaming can be reduced. Also, there is a reduction in the mixing during the flour stage to avoid gluten over development. Low or reduced fat doughs and batters should be mixed at the minimum time required for ingredient dispersion.
- Bake at the minimum recommended time and temperature levels and gradually increase if necessary.

A Dried Plum Example To Eliminate Trans Fat

Formula

REDUCED-FAT CARROT CAKE & MUFFINS (Flour Basis)

Ingredient	Full Fat Control % by weight	Dried Plum Alternative % by weight
Stage 1		
Dried plum puree	--	91.00
Shortening	159.25	--
Sugar (granulated)	89.00	89.00
Egg white (liquid)	15.00	15.00
Vanilla extract	1.40	1.40
Almond extract	0.70	0.70
Stage 2		
Flour (all purpose)	100.00	100.00
Baking powder	1.90	1.90
Baking soda	2.40	2.40
Salt	1.40	1.40
Cinnamon	1.00	1.00
Carrots (shredded)	72.00	72.00
Pineapple (crushed in juice)	64.00	64.00
Golden raisins	19.80	19.80
Walnuts (diced)	18.00	18.00
Water (variable)	84.00	84.00
TOTAL	629.85	561.60

Procedure

1. **Stage 1:** Mix all ingredients at low speed for 30 seconds. Scrape. Mix at high speed until smooth and light.
2. **Stage 2:** Add to Stage One ingredients and mix at low speed for 30 seconds. Scrape. Mix again at low speed for 2 more minutes or until well distributed.
3. Deposit into oiled pans, about 1/2 full. Bake at 350°F for 30-35 minutes. For muffins fill lined or greased cups 2/3 full and bake 25-30 minutes.

Nutritional Profile

REDUCED-FAT CARROT CAKE & MUFFINS (3.5 ounce muffin or 100 grams)

	Full Fat Control	Dried Plum Alternative
Calories	449	215
Calories from fat	302	18
% calories from fat	67%	8%
Fat (g)	34.0	2
Trans Fat (g)	4.14	0
Cholesterol (g)	0	0
Sodium (mg)	255	233

Source: California Dried Plum Board