

TECHNICAL BULLETIN

THE DO'S AND DON'TS **FOR MAKING REDUCED FAT BAKED GOODS** **USING DRIED PLUMS**

The elimination of fat in many bakery products runs counter to bakery tradition and science. The availability of numerous synthetic and natural commercial fat replacers does not make understanding and applying the process of fat reduction or fat elimination any less confusing.

These pages list helpful tips when using dried plums to replace butter, shortening, and oil in bakery formulas. *These tips ONLY apply to dried plums* so caution is advised if alternative fat replacers are used.

An evaluation of the composition of dried plums by the California Dried Plum Board uncovered a unique combination of naturally occurring components that form a *fruit system* responsible for dried plums' fat sparing abilities:

Pectin: Dried plums contain a unique blend of both soluble and insoluble pectins (7.5%) which help to form a *stable film around air and leavening gas during mixing and bench time*. The pectins are also believed to have the ability to *entrap flavor components for gradual release* during mastication.

Sorbitol/Reducing Sugars: Dried plums are unique in their naturally high sorbitol content (15%). Sorbitol is an *effective humectant*, and thus helps to keep bakery products *soft and moist* over an extended shelf life. The reducing sugars, fructose and glucose work with sorbitol to provide *further humectancy*.

Malic Acid: Dried plums contain about 2% naturally occurring 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 carry-through during the chewing process. Additionally, malic acid helps to *inhibit microbial spoilage* and can also serve as the *natural acid component* of 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. It only takes the *commitment of the baker* to make it happen.

GENERAL PRINCIPLES OF USING DRIED PLUMS TO REPLACE FAT IN BAKING

Do's

1. For best results use a dried plum puree (some commercially available alternatives are called dried plum butter or Hungarian Lekvar) or dried plum powder. Puree is usually about 45% dried plums with the remainder being various combinations of water, corn syrup, and/or other fruits/fruit pectins. The important thing to note about purchasing puree is that it must *not contain added spices or flavors*.

Puree can also be made from scratch. The formula is on the last page. Dried plum powder can also be rehydrated to make a puree (if desirable) using equal parts of powder and water (by weight).

Powder is the whole dried plum dried to about 3.5-4.0% moisture. Powder mixes easily with other dry ingredients. Note that larger particle size, i.e., granules or dried plum fiber is not recommended for these applications. Dried plum powder is best used when making dry bakery mixes.

2. For any formula or recipe begin by removing half of the added fat (butter or shortening) and substitute *one-half the volume or weight of fat called for with dried plum puree*. This may vary depending on your objectives. For example, in some instances only a quarter to a third of the original fat quantity is necessary to achieve satisfactory results. Higher quantities are generally used in products where a long shelf life is desired. Higher levels will result in a darker, more moist product.

3. Low-fat bakery products are more tender with slightly higher than normal sugar levels. While this added sweetness may be desirable, it can be reduced slightly, i.e., about 1/3 to 1/2 lb. less per one pound of dried plum puree used.

4. As dried plum puree is acidic, products may benefit by the addition of a small amount of baking soda in addition to that normally used. Too much baking soda, however, will cause a darkened crumb and crust color as well as off-flavor.

5. Dried plum puree carries and enhances flavors very well. However, it may be desirable to try adding commercially available flavors. Additional amounts of vanilla or instant espresso coffee powder in chocolate formulas can also greatly enhance flavors.

6. When producing low or reduced-fat baked goods using dried plums, total mixing time is significantly less, because extensive creaming that is usually associated with full-fat formulas can often be reduced or eliminated. Also, there is a reduction in the mixing during the flour mixing stage to avoid gluten over development.

Don'ts

1. *Don't over mix.* Fat normally coats flour glutens, thus inhibiting their development. Low- or reduced-fat formulations thus tend to result in more readily developed gluten, and thus toughness in the finished product.

Therefore, low- or reduced-fat doughs and batters should be *mixed at the minimum time* required for ingredient dispersion. Use low protein cookie and pastry flours.

2. *Don't over bake.* Reduced- and low-fat baked goods are very sensitive to baking time and temperature. Bake at the minimum recommended time and temperature levels and gradually increase if necessary.

3. *Don't replace 100% of the fat* called for in the formula with the same amount of dried plum puree or dried plum powder. Rather, substitute half as much puree or powder for the full amount of fat removed.

Specific Tips

Cookies

1. Use low protein cookie flour. Add flour at last stage and mix just until incorporated.

2. For increased spread, some of the granulated sugar can be introduced into the flour mixing stage.

3. Bake time is more critical than ever in low-fat formulas. Under baking: too moist; over baking: too dry.

4. Lightly oil the baking sheet or pan.

5. Low-fat cookie dough tends to stick to the wires during wire cutting. Some manufacturers prefer a knife cutting attachment. A vibrating attachment is available which can help to dislodge the cookie dough from the wire.

6. Try one of the commercially available egg replacers for extra tenderness.

Muffins/Cakes

1. For increased leavening, try adding half of the baking soda at Stage 2, along with the dried plum puree. The soda will react with the acids in the puree forming carbon dioxide which will be whipped into the puree. Then fold in the remaining ingredients at low speed.
2. As with cookies, the flour should be low protein, and should be mixed only enough for even incorporation.
3. Low-fat muffins tend to stick to paper liners. A light oil release spray helps.
4. Try using one of the commercially available egg replacers for extra tenderness.
5. If excessively gummy, reduce the level of dried plum puree, keeping in mind that a shelf life trade off may be the result.

DRIED PLUM PUREE (Yields 2 Quarts)

Ingredient	Weight/Measures	Procedure
Softened pitted dried plums	3 lbs.	Using any commercial size (1 gal. capacity) food processor, place dried plums, sugar and corn syrup.
Granulated sugar	½ cup	
High fructose corn syrup	1 cup	Star motor and gradually add boiling water.
Boiling Water	2-1/2 cups	Process about 2 minutes or until mixture is smooth. Scrape and mix again until completely smooth.
		Cool completely, cover and refrigerate.

Dried plum puree can be kept refrigerated for 6 to 8 weeks. Use directly from the refrigerator. For longer storage, freeze and thaw before using.

Note: To make puree without a processor, combine all ingredients in large saucepan. Bring to boil, cover pan, and stew dried plums slowly until fruit is very tender. Mash well with large wooden spatula, pressing dried plums along side of saucepan. Alternatively, grind this mixture through the finest blade of a meat grinder.

This formula can be increased by any multiple to yield larger batches.

SCRATCH-MADE DRIED PLUM PUREE COMPOSITION*
(Proximate)

Component	Amount Per 100 g	Vitamins	Amount Per 100 g
Moisture, g	46.60	Vitamin C, mg	1.90
Energy, Kcal	188.00	Thiamin, mg	0.05
Protein, g	1.40	Riboflavin, mg	0.09
Fat, g	0.30	Niacin, mg	1.10
Ash, g	2.60	Panthenic Acid, mg	0.26
Total Dietary Fiber, g	4.20	Vitamin B6, mg	0.15
Soluble Dietary Fiber g	2.40	Folacin, microg	2.10
Total Carbohydrates, g	49.10	Vitamin A, IA	1,144.00
Available Carbohydrates g	44.90	Vitamin A, RE	115.00
		Beta Carotene, mg	0.68
Minerals			
Calcium, mg	35.40	Simple Carbohydrates	
Copper, mg	0.25	Fructose, g	8.60
Iron, mg	1.43	Glucose, g	18.40
Magnesium, mg	26.00	Sorbitol, g	8.60
Manganese, mg	0.13	Sucrose, g	4.50
Phosphorous, mg	47.80		
Potassium, mg	437.50		
Sodium, mg	13.00		
Zinc, mg	0.30		