

California Dried Plum Board

Technical Bulletin

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California Dried Plums Offer Confectioners a Sweet Solution to Control And Reduce Fat, Calories, Sugar and Carbohydrates

BACKGROUND

According to the National Confectioners Association, the confectionery industry is \$25 billion in annual retail sales (2003). In response to consumer demand for more health-conscious alternatives, a relatively new confection segment has emerged: sugar free, low-sugar, low-carbohydrate, calcium and vitamin-fortified. This segment reached \$100 million in sales in 2003. More importantly it is growing at 90% per year.

Increased consumer interest in and new government guidelines for weight control and calorie reduction present confectionery food designers with the biggest challenge of any food for nutritional improvement. One approach is to reduce the fat and sweeteners in chocolate. Another is to attack the fillings. Success with these nutritionally modified confections has been mixed. Similar to bakery products, **taste and texture are the problems**. Indulgence foods rely on sensory satisfaction as the primary consumer appeal. Recently, sugar alcohols have been used to sweeten confections and have come the closest to meeting consumer sensory requirements. Even with reduced fat, calories and carbohydrates, poor taste and texture won't sell indulgence foods because these foods are not purchased as a necessity.

All of this is about to change. California dried **plum purees, powders and juice concentrates** provide a complete fruit-based system to balance the nutritional composition of confections with flavor, texture and convenience. Multi-functional dried plums can also replace various ingredients to potentially reduce cost. And, because these are natural ingredients, dried plums improve label perception for consumers seeking shorter label declarations with recognized ingredients.

California Dried Plum Sugars--Virtually Sucrose-free

The main sugars found in **fresh plums** are glucose, fructose and sucrose. Also, sorbitol, a sugar alcohol is present. In general, prune-making plums contain twice as much total sugar at harvest than other varieties of plums.

When compared with fresh prune plums, the concentration of **sugar increases in California dried plums**, because of dehydration, but there are also **qualitative changes** in the proportion of individual sugars. The most striking change is the **nearly total disappearance of sucrose**, which is hydrolyzed to glucose and fructose during processing. The high temperature of drying disrupts cell structure, releasing fruit acids and invertase, which catalyze the conversion during the first few hours of drying.

California prune juice concentrate has a similar sugar profile to dried plums, because it is made from dried plums by hot water extraction. There is **virtually no sucrose**, and the proportions of glucose, fructose and sorbitol reflect those in dried plums.

**SUGAR COMPOSITION OF CALIFORNIA PRUNE PLUMS,
DRIED PRUNES AND PRUNE JUICE
(g/100 g)**

<u>Sample</u>	<u>Glucose</u>	<u>Fructose</u>	<u>Sucrose</u>	<u>Sorbitol</u>	<u>Total</u>
Fresh Prune Plum	3.1	3.3	4.4	2.7	13.5
Dried Plums	23.4	16.0	ND	15.0	54.4
Prune Juice Concentrate (64° Brix)	30.6	14.5	0.7	17.8	63.6

ND: Non Detected

Source: Stacewicz-Sapuntzakis M. et al, Chemical Composition and Potential Health Effects of Prunes: A Functional Food? *Critical Reviews in Food Science and Nutrition* 41(4): 251-286 (2001), and California Dried Plum Board

Natural Sorbitol Source

No other fruit has as much naturally occurring sorbitol as California dried plums. This sugar alcohol is about 60% as sweet as sucrose and has been shown to be an effective sugar replacement in confections, baked goods and other indulgence foods.

SORBITOL CONTENT OF SELECTED FRUITS	
<u>Fruit</u>	<u>% Sorbitol</u>
California Dried Plums	15.0
Pears (Bartlett)	2.6
Plums (Purple)	1.7
Apples (Winesap)	0.6
Nectarines	0.6
Peaches	0.5
Apples (Golden Delicious)	0.2
Grapes (Black)	0.2
Grapes (Red)	Trace
Grapes (White)	Trace
All other Fruits tested*	None
* Bananas, cranberries, figs, raisins, apricots, oranges, lemons, limes, dates, strawberries, pineapple)	
Source: <i>Quality Determination of Sugars, G. L. C. Separations of Derivatives</i> ; Kline, Davis, A., et al; Journal of AOAC, Vol. 53, No. 6, 1970, PP1198-1202, California Dried Plum Board	

Carbohydrate Control...Low Glycemic Response

California dried plums contain about 62.7% carbohydrates per 100 grams. Therefore, when designing nutritionally improved confections, dried plums become a natural consideration. However, the sugars in dried plums do not elevate blood sugar levels rapidly and their glycemic response or index (GI) is in the low range, i.e., 29 +/-4 (*Classification proposed by Dr. J. Brand-Miller--high>70, intermediate 56-69, low <55*). The reasons for this low glycemic index are due to the variation in sugar profiles and fiber content of dried plums.

The Glycemic Index (GI) measures how fast food is likely to raise blood sugar and can be helpful for those who are monitoring their blood sugar level. Per gram of carbohydrate, foods with a high glycemic index produce a higher peak in postprandial blood glucose and a greater overall blood glucose response during the first two hours after consumption than do foods with a low GI.

Both the quantity and quality of carbohydrate influence the glycemic response. By definition, the GI compares equal quantities of carbohydrate and provides a measure of carbohydrate quality but not quantity. In 1997 the concept of Glycemic Load (GL) was introduced to quantify the overall glycemic effect of a portion of food.^{1,2,3} As a result, the GL of a typical serving of food is the product of the amount of available carbohydrate in that serving and the GI of the food. The higher the GL, the greater the expected elevation in blood glucose and in the insulinogenic effect of the food.

California dried plums have a Glycemic Index (GI) of 29 (+/-4) and a Glycemic Load (GL) of 10 based on a 60g serving size.

GLYCEMIC INDEX/LOAD OF DRIED PLUMS AND SELECTED FRUIT (60g Serving)		
<u>Fruit</u>	<u>GI</u>	<u>GL</u>
Fresh apples*	36	6
Bananas*	52	12
Oranges*	42	5
California Dried plums	29	10
Dried apples	29	10
Apricots	30	8
Dates	103	42
Figs	61	16
Raisins	56	25
* 120g serving size		
Foster-Powell K, Holt SHA, Brand-Miller JC, <i>International table of glycemic index and glycemic load values: 2002. Am J Clin Nutr; 76-5, J</i>		

Fat Control

California dried plums have a unique blend of both **soluble and insoluble fibers** along with high levels of naturally occurring **sorbitol** that mimic many of the textural characteristics of fat. In addition, dried plums also contain about **2% malic acid** that has been shown to function as a flavor potentiator in processed foods. Malic acid is particularly effective when replacing fat in confectionery fillings. Two examples of dried plum's fat and carbohydrate reducing capabilities were developed using dried plum powder: **chocolate truffles and peanut butter cup.**

Reduced Carb/Low Fat Chocolate Truffles*

INGREDIENTS	FILLING (%)	TOTAL (%)
Fat Free Sour Cream	27.28	20.46
Semisweet Chocolate, Finely Chopped	24.56	18.42
Dried Plum Powder	12.67	9.50
Heavy Whipping Cream	9.75	7.31
Bittersweet Chocolate, Finely Chopped	6.24	4.68
Whey Protein Isolate	4.87	3.65
Inulin	3.90	2.93
Fat Free Half and Half	3.90	2.93
Maltodextrin	2.44	1.83
Polydextrose	1.95	1.46
Crystalline Sorbitol	1.95	1.46
Cocoa, Dutched, De-fatted	0.49	0.37
SUBTOTAL (filling)	100.00 %	75.00 %
Maltitol Dark Chocolate Coating	-	25.00 %
TOTAL	-	100.00%

Procedure:

1. In a small saucepan, stir heavy whipping cream, fat free half and half, fat free sour cream, sorbitol, polydextrose, inulin, maltodextrin, and dried plum powder together. Bring just to a boil over medium heat, stirring constantly.
2. Transfer mixture to a food processor and process until smooth.
3. Stir into semisweet and bittersweet chocolate in bowl, until chocolate is melted.
4. Add dry whey protein isolate and de-fatted cocoa, stirring until evenly dispersed. Cool mixture to room temperature.
5. Cover and refrigerate for at least 8 hours.
6. Spoon chocolate mixture into small mounds onto parchment-covered baking sheets. Chill just until set (about 30 minutes).
7. Melt dark chocolate coating and cool until it is barely warm.
8. Using a small amount of cocoa, roll each mound into a ball.
9. Dip each chocolate ball into melted maltitol dark chocolate coating, shaking off excess.
10. Place in refrigerator 5 minutes, or until coating is set up.
11. Transfer to a shallow pan and refrigerate, uncovered.
12. Once chilled, store in airtight container in refrigerator.
13. Bring to room temperature to serve.

* Recipe was originally developed for the Dried Plum Board by Chef Gale Gand as a low-fat truffle. Fat and carbohydrate content has been lowered further.

Truffle Nutrition Facts		
Serving size	20g	
Calories	70	
Calories from fat	30	
		% Daily Value
Total fat	3.5g	5%
Saturated fat	2.5g	13%
Cholesterol	0mg	0%
Sodium	10mg	0%
Total Carbohydrate	10g	3%
Dietary fiber	1g	6%
Sugars	3g	
Sugar alcohol	3g	
Protein	2g	
Source: California Dried Plum Board		

Reduced Carb/Low Fat Peanut Butter Cup

INGREDIENTS	COMPONENTS (%)	FINAL (%)
Peanut Butter, Reduced fat	33.44	20.99
Water	17.01	10.67
Peanut Flour, Dark Roasted	16.74	10.50
Maltitol	15.99	10.03
Dried Plum Powder	7.64	4.79
Whey Protein Isolate	4.94	3.10
Inulin	2.62	1.64
Oat Fiber 300	0.73	0.46
Polydextrose	0.73	0.46
Peanut Flavor	0.17	0.11
SUB TOTAL 1	100.00 %	62.75 %
Maltitol Dark Chocolate Coating	-	37.25
SUB TOTAL 2	100.00 %	37.25 %
TOTAL	-	100.00 %

Procedure:

1. Mix peanut butter, maltitol syrup, polydextrose, and part of the water together with paddle on low speed, just until combined.
2. Add all remaining dry ingredients and blend to incorporate.
3. Add remaining water, while beating on low. Beat until mixture comes together.
4. Use maltitol dark chocolate coating to line bottom and side of a 1-inch paper liner. Place at 40° F for 5-10 minutes, or until set.
5. Fill with peanut butter filling. Seal by covering top with maltitol dark chocolate coating, placing at 40° F for 5-10 minutes.

Peanut Butter Cup Nutrition Facts

Serving size	19g	
Calories	70	
Calories from fat	35	
		% Daily Value
Total fat	3.5g	6%
Saturated fat	2g	11%
Cholesterol	0mg	0%
Sodium	40mg	2%
Total Carbohydrate	10g	3%
Dietary fiber	1g	6%
Sugars	1g	
Sugar alcohol	6g	
Protein	3g	
Source: California Dried Plum Board		

Conclusion

The confectionery market continues to evolve in multiple ways responding to consumer's changing taste as well as nutritional preferences. "Zero guilt" is one reason consumers are migrating to less fattening treats. Variety is another reason. In the past, the sugar-free confectionery category was limited to hard candy and chocolate aimed at diabetics. Products were produced by companies that specialized in foods for special diets and not by mainstream candy companies. This is no longer the case, however, as confectioners of all sizes enter the reduced carb, reduced sugar, reduced calorie categories.

The search for nutritional and sensory modifications in food design has pushed confectioners into new directions and created opportunities for new ingredients as fillings and coatings. California dried plums unique multi-functional benefits offers confectioners natural solutions to satisfy both sensory and nutritional objectives. As confectioners pay more attention to candy ingredients, labeling implications and marketing claims, dried plums should be a primary consideration.

(1) Salmeron J, Ascherio A, Rimm E, et al. Dietary fiber, glycemic load, and risk of NIDDM in men. *Diabetes Care* 1997;20:545-50

(2) Salmeron J, Manson J, Stampfer M, Colditz G, Wing A, Willett W, Dietary fiber, glycemic load and risk of non-insulin-dependent diabetes mellitus in women, *JAMA* 1997;277:472-7

(3) Liu S, Willett W, Stampfer M, et al. A prospective study of dietary glycemic load, carbohydrate intake, and risk of coronary heart disease in US women. *Am J Clin Nutr* 2000;71:1455-61

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