La Petite Brownie

Eva Star

Louisa Bayoud

Hyen Ah Lee

Tiffany Wilson

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Abstract

Our goal was to create a product (a brownie) that could be consumed by diabetics. We based our approach on a vegan brownie recipe (due to its existing nutritious formulation), and after many trial and error sessions, including comparisons to traditional non-vegan recipes, we developed two recipe variations suitable for diabetics: one was made with eggs and the other was made with tofu (without eggs). We used a hedonic 7-point scale to have our product evaluated by the CSUN student population (n=29) and found that there was only a moderate positive response to either product. Our test group, however, did not focus on diabetics and/or vegans, and the results may have been more positive if we had limited our testing to the actual target group.

Introduction

Consumers are increasingly concerned about their food's nutritional composition. This concern leads to a new desire to find healthy quick snacks. These consumers are looking for products low in fat, calories, and high in fiber, which gives them an extended feeling of satiety. Another movement is towards functional foods, in which carotenoids are already recognized as a health food by consumers. Cocoa has also has been proven to be an antioxidant and is considered to improves circulation in users (Sloan. [Updated 2009]).

In addition, the diabetic population of all ages is growing according to the ADA and current makes up 8% of the U.S population, which means that over 23.6 million children and adults have diabetes in the U.S. (Diabetes Statistics … [updated 2007]). Many of the diabetics suffer from other chronic diseases caused by diabetes, therefore there are many supplements, herbs and other remedies on the market to aid the diabetics in managing their disease. As new clinical research confirms there are new innovative forms of fiber, also old forms, such as whole grains, to help in controlling the glucose level in the blood and to promote digestive health. These

fibers are not merely blazing a new trend in diabetes; there are nuts, soy protein and flaxseed also in the forefront of this movement (Sloan. [Updated 2009]). In conjunction with fiber, diabetics are naturally interested in sugar substitutes that would improve the nutritional value and taste of foods, also lower the carbohydrate intake. One of such substitute is stevia, which some research in Switzerland claims might be beneficial to brain health. The stevia extract claims to boost chemical brain signals leading to improvement in cognitive functions (Cosgrove [updated 2009]).

As for prospective marketing, the diabetic population will be a growing market since diabetes is on the rise. There are presently only limited baked goods in the supermarket bakeries catering to diabetics. The advantage being that since these new diabetics will look for ways to eat their favorite foods, such as brownies, while hoping to control their glucose level. So our approach was to create a brownie that diabetics will find appealing and be able to enjoy.

The recipe we used for the brownies was designed to meet the findings of the research in this area. The tofu we use in the recipe is a soy protein which aide's a diabetic in energy management and the whole grain flour adds the fiber. In addition to meeting the basic diabetic requirements in respect to the brownie we also incorporated other health benefits. The fat content of the brownie is lowered by adding applesauce to make our product lower in fat. Whole grain flour is also used to help control hunger which added to the overall benefit of the brownies. Adding carrots, cocoa powder, and non-sweetened chocolate achieved the sought after antioxidants that benefit the vascular health of our consumers. (Sloan. [Updated 2009]). We used flaxseed oil which contains alpha-linoleic acid in place of butter or margarine. It is also a great source of insoluble and soluble fiber which helps reduce cholesterol levels (Flaxseed… [Updated 2009]). In addition, by incorporating stevia in the form of *Stuvia*, which provide our consumers a sugar-free, lower calorie food, which may be able to improve their brain function (Cosgrove

[updated 2009]).

The purpose of this research was to create an alternative brownie that targets a large segment of consumers who are looking for a healthier choice to their current foods. We researched for a method to make it bite-size, low in sugar, low in calories, and enriched with fiber and Omega 3 fatty acids, which are extremely beneficial to a person's health. As an added bonus, because of the ingredients that are used, this brownie could be categorized not only as a brownie for diabetics but also as a *vegan brownie suitable for diabetics*. Overall our research provides an approach in which our brownie will help diabetics keep their blood sugar level under control, as well as, providing benefits to other groups to soothe hunger pains, provide various benefits, and provide the sweet treat they are craving without gaining weight (Sloan.[updated 2009]).

Experimental Procedure or Methods

When we initially began determining our product scope, we brainstormed our ideas and focused mostly on designing a product for children who dislike vegetables and fruits, but not excluding any other groups who dislike vegetables and fruits. Our focus, however, changed after we discovered that one of our group members had Type I diabetes. We concentrated our discussion and research on desserts, since this seemed to be an important topic regarding diabetics. We shifted our goal more towards decreasing the carbohydrate in the dessert, increasing the nutritional benefits of food items which usually do not contain any considerable amounts of nutrients, and reducing the negative effect of empty calories found in food items. We started our product development by researching the need of a new product for diabetics in the supermarket and there we found few bakery items and no chocolate products available. In the process we came across an existing product class called "brownie bites" which gave us the idea for our *La Petite Brownie.*

In addition to the lack of bakery products for diabetics in the supermarkets, our research found that one million new cases of diabetes mellitus are reported yearly, therefore our product will be in greater demand with each year (Sloan. [Updated 2009]). These new diabetics will look for ways to eat their favorite foods, such as brownies, also hoping to control their glucose level. Our thought was to increase the fiber content, add antioxidants, a sugar substitute and flaxseed oil to increase the health benefits also reducing the health risk of the brownie. We found a vegan recipe which we modified it to fit our needs.

In the experimental stage of the process we discovered that after baking there was an unpleasant aftertaste from the sweeteners we used. After several different combinations of sweeteners the aftertaste was palatable. The texture was impacted by the use of carrots which added a slightly crunchy texture. In addition the texture of the brownie changed as we added the applesauce; the increase of applesauce changed the texture from cake-like to more "brownie like" and made it more dense and moist. We used a hedonic 7-point scale to have our product evaluated by the CSUN student population (n=29).

The software we used to analyze the nutritional information was the "*Food Processor"* software used in the CSUN FCS Dietetics department. We entered the measured amount of the ingredients used for the brownie into the software. From this information the software created the nutrition facts for the food label. We also extracted a food list and a multicolumn report which contains the food items, caloric information and the basic food components. The other reports we extrapolated provided a food pyramid and a ratio and percents printout.

Results and Discussion

Once the product was developed we conducted a taste test. It was conducted at the CSUN experimental kitchen and used students, faculty, and staff to evaluate our product. These subjects

were chosen at random from the general public of the campus. 31 subjects were provided two different recipe samples of the brownies (both of which were appropriate for diabetics but one was made with egg whites (non-vegan) and the other with tofu (vegan)). They were instructed to fill out an evaluation form based on their sensory impressions of taste, texture, and sweetness. They were asked to grade the samples on a hedonic 7-point scale from *like extremely* to *dislike extremely*. The results were compiled and reviewed by the group.

At the group review of the compiled information we discovered that out of the 31 participants 2 had not filled out the evaluation forms completely. We omitted these two forms and did our calculations on 29 participants. The combined results of our tests (which measured texture, taste, and sweetness) were that the participants liked our vegan brownies slightly more than the non-vegan brownies – although the actual sweetness of the vegan brownie was its weakest characteristic. The strong point of the vegan brownie was its texture. But in respect to the vegan brownie, the preference test indicated that a vegan product was not in great demand.

Conclusions and Recommendations

Even though the taste test results may not have been what we hoped, we were very satisfied overall with the product. We could not find a combination of sweeteners that tasted like sugar, were still suitable for diabetics, but without an aftertaste. As we did not have access to a target population of vegans and diabetics to sample our brownie, we believe that our taste test results may well have been more favorable had that been the case. Such a target population would have a better understanding of the relationship of our product to other available vegan and diabetic products, whereas the actual target group most likely compared our product to non-vegan and non-diabetic products in their evaluations. Also taken into consideration was a cost analysis of our product. A box of gourmet double fudge brownies found at Albertsons retails for $4.49

versus a cost of $8.58 for our specialty brownies. However, with the recent increase in sales of specialty foods (organic, etc.), this increase in price is not likely to hamper sales of our product, especially when the product contents are compared by today's more discerning and health-conscious consumers.

The product we created was much healthier than the average brownie. In one serving it had four grams of dietary fiber, four grams of protein, only 3 grams of sugar and no cholesterol. It certainly was palatable and tasted fairly good. We were able to create a nutritious food that met a number of our criteria that we feel strongly would result in a healthier product and could be easily marketed to its target consumers (provided further research could be conducted on that target group).

Nevertheless, our test results did point out that we need to develop a brownie with a better taste in respect to its sweetness properties, which is the weak point determined by testing. From this point we can now explore further sweetener combinations which complement each other and bring out a sugar taste without the aftertaste. In addition, we need to do more research regarding the increase of the fiber content of the product - which would promote our goal of improving consumer health. In all of the trials, which included fiber, we did not achieve an acceptable outcome since the recipes that included fiber either added excessive calories or adversely affected the consistency of the brownies. Since we only used over the counter fiber products a search into the availability of a commercial product might benefit our product. And after more research, and additional recipe modifications, this would again, of course, need to test our product and hopefully be able to focus on a more intended target group.

List of References:

About Truvia. [Internet]. [Updated 2009]. Truvia.com; [cited 2009 Nov. 28]. Available from: http://www.truvia.com/about/default.aspx

Barnard, T, and Kramer S. (1999). How it all vegan! Vancouver (B.C) Arsenal Pulp Press. P 143

Betty Crocker's Cookbook. (1978) New and Revised Edition. New York (NY). Golden Press. P 271

Cosgrove J. Another Victory for Cocoa [Internet] [updated 2009]. Nutraceuticals World; [cited 2009 October 26]. Available from: http://www.nutraceuticalsworld.com/articles/2009/10/online-exclusive-another-victory-for-cocoa

Cosgrove J. Stevia for Brain Health. [Internet] [updated 2009]. Nutraceuticals World; [cited 2009 October 26]. Available from: http://www.nutraceuticalsworld.com/articles/2009/10/online-exclusive-stevia-for-brain-health

Diabetes Statistics Internet] [updated 2007]. American Diabetes Association. [cited 2009 October 26]. Available from:http://www.diabetes.org/diabetes-basics/diabetes-statistics/

Flaxseed. [Internet]. [Updated 2009]. BellyBytes.com; [cited 2009 Nov. 27]. Available from: http://cc.bingj.com/cache.aspx?q=flaxseed+oil+baking&d=4564223142789779&mkt=en-U

Hackett, Jolinda. What can I use to substitute for eggs in a recipe? [Internet]. [Updated 2009]. New York(NY): About.com; [cited 2009 Nov. 20]. Available from: http://vegetarian.about .com/od/vegetarianvegan101/f/eggsubstitute.htmS&setlang=en-US&w=63126234,7166fc90

Ingredient functions. [Internet]. [Updated 2009]. Recipetips.com; [cited 2009 Nov.20]. Available from: http://www.recipetips.com/kitchen-tips/t--657/ingredient-functions.asp

Sloan. E. Up-and-Coming Markets. [Internet]. [updated 2009]. Ramsey (NJ). Nutraceuticals World; [cited 2009 October 26]. Available from: http://www.nutraceuticalsworld.com/articles /2009/09/upandcoming-markets

Sloan. E. Up-and-Coming Markets. [Internet]. [updated 2009]. Ramsey (NJ). Nutraceuticals World; [cited 2009 September 22]. Available from: http://www.nutraceuticalsworld.com/ articles/2003/10/upandcoming-markets

The Truth about Splenda. [Internet]. [Updated 2009]. Women's Health & Weight Loss; [cited 2009 Nov. 20]. Available from: http://www.womenshealthweightloss.com./oct08/splenda.html

Tiwari. P., and others [Internet]. [updated 2008]. Sweetener blends or sugar substitutes: A way to enhance the sweetness [cited 2009 Oct. 26]. Available from: http://www.pharmainfo.net/reviews/ sweetener-blends-or-sugar-substitutes-way-enhance-sweetness

La Petite Brownie

Appendices

Product Formulation:

Original Recipe: Vegan Chocolate Pecan Brownies

Ingredients:

- 250 g soft or medium tofu
- 196 g sugar
- 22 ml vanilla extract
- 60 ml Safflower oil
- 20 g cocoa powder
- 110 g whole-wheat pastry flour
- 10 g baking powder

Preparation:

Preheat oven to 350° F. In a blender or food processor, blend the tofu, sweetener, vanilla, oil, and cocoa powder until smooth and creamy. In a large bowl, sift the flour and baking powder together. Add the flour mixture into the tofu mixture, and mix together gently until "just mixed." If the batter is too dry, add a splash of water. Spoon the batter into a lightly oiled 8″x 8″ cake pan and bake for 20 -25 minutes. Test with a knife to see if done. Let cool in pan before cutting into squares.

First Modification:

We started out with the above vegan brownie. To achieve the desired sugar free product we replaced the sugar with an artificial sweetener, *Slenda.* To reduce the fat content we replaced half of the oil with apple sauce. The result was undesirable since the brownie had a bad aftertaste from the *Slenda,* it did not have the desirable chocolate flavor, and was too dry. The following recipe was used in the next modification:

- 250 g soft or medium tofu
- 36 g Splenda* (replaced 196 g sugar)
- 22 ml vanilla extract
- 30 ml Safflower oil
- 110 g apple sauce was substituted for 30 ml oil
- 20 g cocoa powder
- 110 g whole-wheat pastry flour
- 10 g baking powder

  (* indicates ingredient added or changed in recipe – also applies to all recipies in following modifications)

Second Modification:

In this trial we added Baker's chocolate square to enhance the chocolate taste and add antioxidant properties to the brownie. With this formulation we achieved the required chocolate taste and the recipe was changed to the following:

- 250 g soft or medium tofu
- 36 g Splenda
- 22 ml vanilla extract
- 30 ml Safflower oil
- 110 g apple sauce
- 20 g cocoa powder
- 116 g unsweetened baking chocolate*
- 110 g whole-wheat pastry flour
- 10 g baking powder

Third Modification:

To produce the required sweetness we only used Xylitol and Erythritol, which are alcohol sugars and hoped to achieve a synergistic effect (Tiwari and others 2008), but our results were less than desirable. The brownie was not sweet enough. In addition, the Erythritol and the Xylitol cost $7.50 per pound and it would have not been cost effective to add more sweetener to make it a

sweeter product. The alcohol sugars also had as slight cooling effect in the mouth, which added a new unexpected dimension to our brownie. The recipe we used was the following:

- 250 g soft or medium tofu
- 50 g Xylitol*
- 100 g Erythritol*
- 22 ml vanilla extract
- 30 ml oil and 110 g apple sauce was substituted for 60 ml oil
- 20 g cocoa powder
- 116 g unsweetened baking chocolate
- 110 g whole-wheat pastry flour
- 10 g baking powder

Fourth Modification:

We made the following recipe and separated it into 4 batches:

<table>
<tr><th colspan="4">CHOCOLATE BROWNIE FOR DIABETICS</th></tr>
<tr><td colspan="2">1st Version (2 batches)</td><td colspan="2">2nd Version (2 batches)</td></tr>
<tr><td colspan="4">250 g soft or medium tofu
22 ml vanilla extract
30 ml oil
110 g apple sauce
20 g cocoa powder
116 g unsweetened baking chocolate
110 g whole-wheat pastry flour
10 g baking powder</td></tr>
<tr><td colspan="2">Splenda 36g</td><td colspan="2">Xolytol 100g</td></tr>
<tr><td>Fiber Sure 216g</td><td>No Fiber</td><td>Fiber Sure 216g</td><td>No Fiber</td></tr>
</table>

Batches: #1 with Splenda and fiber

#2 with Splenda, no fiber

#3 with Xylitol and fiber

#4 with Xylitol and no fiber

With this version we tried to determine the effect of fiber on the product since the additional fiber could benefit diabetics (Sloan...[updated 2009]). The results were that the products without fiber were more cake like and the brownies with fiber did not bake well. Even after an additional 10 minutes of baking the fiber filled brownies still seemed to be under cooked and lacked the brownie texture.

Fifth Modification:

For this trial we added carrots and sweet potatoes for their textures, natural sugars, moisture and health benefits. We did achieve the consistency of a brownie (compact and moist). The dark chocolate color was acceptable due to the use of two unsweetened chocolates (powder and bar form). However, the brownies were overly moist due to the use of the fruit and the vegetables. Adding all these additional ingredients might have added too much moisture since tofu already contains a significant amount of water. Also, the aftertaste was stronger in batches 1 and 2 with Splenda and Xolytol since these are chemicals. Adding the vegetables shortened the shelf life of the brownies. They developed mold growth 3 days after baking. These brownies needed to be refrigerated. The recipe was as following:

- 250 g soft or medium tofu
- 50 g Xylitol
- 100g Splenda
- 22 ml vanilla extract
- 30 ml Safflower oil
- 110 g apple sauce
- 20 g cocoa powder
- 116 g unsweetened baking chocolate
- 110 g whole-wheat pastry flour
- 10 g baking powder
- 100 g carrots*

- 90 g sweet potatoes*

Sixth Modification:

We omitted the sweet potato and combined Splenda, Xylitol, and Truvia (a more natural sweetener) which left less aftertaste. The texture was also good but still more cake-like. The recipe was as follows:

- 250 g soft or medium tofu
- 50 g Xylitol and 100g Erythritol was omitted.
- 15 g Splenda*
- 20 g Truvia*
- 22 ml vanilla extract
- 30 ml safflower oil
- 110 g apple sauce
- 20 g cocoa powder
- 116 g unsweetened baking chocolate
- 110 g whole-wheat pastry flour
- 10 g baking powder
- 100 g carrots

Seventh Modification:

We added ground flaxseeds to increase the fiber content but by doing so we increased the caloric intake considerably and decided to omitted them since 40 g of flaxseeds added about 200 extra calories but would only have provided one extra gram of fiber per serving. Since the dough was too dry in the previous trial we increased the apple sauce. The texture and flavor was good and the apple sauce added enough moisture to make the brownie more moist and dense. The recipe used was the following:

- 250 g soft or medium tofu
- 50 g Xylitol

- 15 g Splenda
- 20 g Truvia
- 22 ml vanilla extract
- 30 ml safflower oil
- 214 g apple sauce*
- 20 g cocoa powder
- 116 g unsweetened baking chocolate
- 110 g whole-wheat pastry flour
- 10 g baking powder
- 100 g carrots
- 40 g flaxseeds*

Eighth Modification:

The flaxseeds was replaced with 14 g of Benefiber which still added the same amount of fiber with much less calories, however, just as in the previous fiber addition, the dough did not bake well. In the oven it inflated to double its size but when it came out of the oven it deflated considerably. In addition, the baked brownie was too moist and looked unbaked . The recipe we used was the following:

- 250 g soft or medium tofu
- 50 g Xylitol
- 15 g Splenda
- 20 g Truvia
- 22 ml vanilla extract
- 30 ml safflower oil
- 214 g apple sauce
- 100 g carrots
- 20 g cocoa powder
- 110 g whole-wheat pastry flour
- 10 g baking powder
- 14g Benefiber*

Ninth Modification:

In the final product modification we decided that instead of using safflower oil we used flaxseed oil which still included some of the benefits of the ground flaxseeds, and also excluded the Benefiber completely. Our final recipe was as follows:

La Petite Brownie

Ingredients

- 250 g soft tofu
- 214 g unsweetened applesauce
- 22 ml vanilla extract
- 30 ml flaxseed oil
- 20 g cocoa powder
- 110 g whole-wheat pastry flour
- 10 g baking powder
- 116 g unsweetened baking chocolate
- 100 g fresh grated carrots
- 50 g Xylitol sweetener
- 20 g Truvia
- 15 g Splenda, no calorie sweetener

Equipment

- Food processor
- 2 Mixing Bowls
- Balance
- Spatula
- Baking Dish
- Baking Spray

Procedures

Preheat oven to 350° F. In a blender or food processor shred carrots until fine, then add the tofu, sweetener, vanilla, oil, and cocoa powder until smooth and creamy. Melt unsweetened chocolate squares in a microwave until soft and then add to tofu mixture and mix in food processor until well blended. In a large bowl, sift the flour and baking powder together. Add the flour mixture to the tofu mixture, and mix together gently until "just mixed." If the batter is too dry, add a splash of water. Spoon the batter into a lightly oiled 8″x 8″ cake pan and bake for 25 – 30 minutes. Test with a knife to see if done. Let cool in pan before cutting into squares (Barnard and others 2008).

Description of Ingredient Functionality:

Tofu is an appropriate egg substitute in baked goods such as brownies and pancakes. It makes baked goods a bit on the heavy and thick side. The texture of silken tofu or crumbled regular tofu is surprisingly similar to boiled or cooked eggs when used in a similar recipe (Hackett…[updated 2009])

Organic Pastry Flour is milled from soft wheat and has slightly higher protein content than cake flour. It contains a lower level of protein than bread flour. When mixed with moisture, the protein in flour turns to gluten that gives the baked goods strength and structure. Pastries and cakes need only a limited amount of gluten. Since the pastry flour contains less protein it creates tender pastries and cakes (Ingredient…[update 2009]).

Baker's Chocolate is cooled, hardened chocolate liqueor which is convenient for use in recipes. It is used primarily as an ingredient in recipes such as brownies, cakes, and frostings (Ingredient…[update 2009]).

Hershey Chocolate Cocoa Powder is alkalized cocoa powder which contains potassium carbonate, sodium carbonate, sodium hydroxide, or magnesium. It neutralizes the naturally occurring acids and makes the powder easier to dissolve in liquids (Ingredient…[update 2009]).

Baking Powder is a combination of baking soda, an acid, and a moisture absorber, which together form a leavening agent. When baking powder is added to moist ingredients, there is a reaction that releases carbon dioxide bubbles. This reaction is what makes the batter or dough rise (Ingredient…[update 2009]).

Flaxseed Oil is used in place of butter or margarine. Substituting the oil causes the heavy texture of the final products. It has a nutty, butter flavor and contains alpha-linoleic acid which is super-unsaturated fat. Flaxseed is also a great source of insoluble and soluble fiber, which helps reduce cholesterol levels (Flaxseed…[updated 2009]).

Carrot provides enough moisture that we don't need to worry about using an egg replacer as a binder. Carrot adds nutritional value of the final products since it contains a very large amount of vitamin A and falcarinol which may prevent cancer (Ingredient…[update 2009]).

Apple Sauce is used as a wet ingredient and binder. In vegan baking, people substitute applesauce or bananas for eggs (Ingredient…[update 2009]).

Vanilla Extract is used to add flavor to baked goods, candies, desserts, sweet fillings, and frostings (Ingredient…[update 2009]).

Splenda is used as a sugar substitute for diabetic patients who should limit the amounts of sugar intake. Although it is 600 times sweeter than table sugar, it has no calories (The truth…[updated 2009])

Xylitol is used as a low-calorie alternative to table sugar. Absorbed more slowly than sugar, it does not contribute to high blood sugar levels caused by insufficient insulin response (Ingredient…[update 2009]).

Truvia is used as a sugar substitute for diabetic patients. It is a zero-calorie sweetener made with the stevia plant. One packet (3.5g) of Truvia natural sweetener provides the same sweetness as two teaspoons of sugar. It is a great alternative for people with diabetes (About Truvia…[updated 2009]).

Post Formulation Note:

In addition to the modifications made above, we decided to compare the vegan brownie with a lower caloric version of a Betty Crocker Brownie recipe which would still be suitable for diabetics. The recipes were as follows:

Second Recipe (Non-Vegan)

Original Recipe Ingredients:

- 116 g unsweetened baking chocolate
- 60g shortening
- 218 g sugar
- 2 eggs
- ½ teaspoon vanilla
- 100 g all-purpose or whole wheat flour
- 2 g baking powder
- 3 g salt

Modifications to the Betty Crocker recipe:

- 116 g unsweetened baking chocolate
- 5 ml vanilla
- 100 g all-purpose or whole wheat flour
- 2 g baking powder
- 120 g Egg whites
- 100 g Carrots
- 60 g Apple sauce
- 30 g flaxseed oil
- 15 g Splenda
- 50 g Xylitol
- 20 g Truvia

Preparation:

Heat oven to 350° F. Shred carrots and melt chocolate in the microwave for 3 minutes. Mix all the dry ingredients together in one bowl and mix all the wet ingredients in one bowl except the chocolate and carrots. Add wet ingredients to dry ingredients and mix lightly. Add melted chocolate and carrots and mix until well incorporated. Spread in 8″x 8″x 2″ greased pan. Bake until brownies begin to pull away from sides of pan, 30 to 35 minutes. Cool slightly. (Crocker 1985)

Sensory Test Results

Date of the Sensory Test: Nov. 16

Number of Panelists: 29

Sample #967 - Brownie suitable for diabetics – with egg whites

Sample #242 - Vegan brownie suitable for diabetics – with tofu

Results for sample # 967 – Brownie suitable for diabetics, with egg whites (Non-vegan)

Table 1. Sensory Test Results (Responses) for Sample #967

								
Code 967	**Like Extremely**	**Like Very Much**	**Like Moderately**	**Neither Like or Dislike**	**Dislike Moderately**	**Dislike Very Much**	**Dislike Extremely**	**Total**
Taste	0	1	10	5	10	3	0	29
Texture	0	2	8	5	8	4	2	29
Sweetness	1	2	11	5	8	2	0	29
Total	1	5	29	15	26	9	2	87

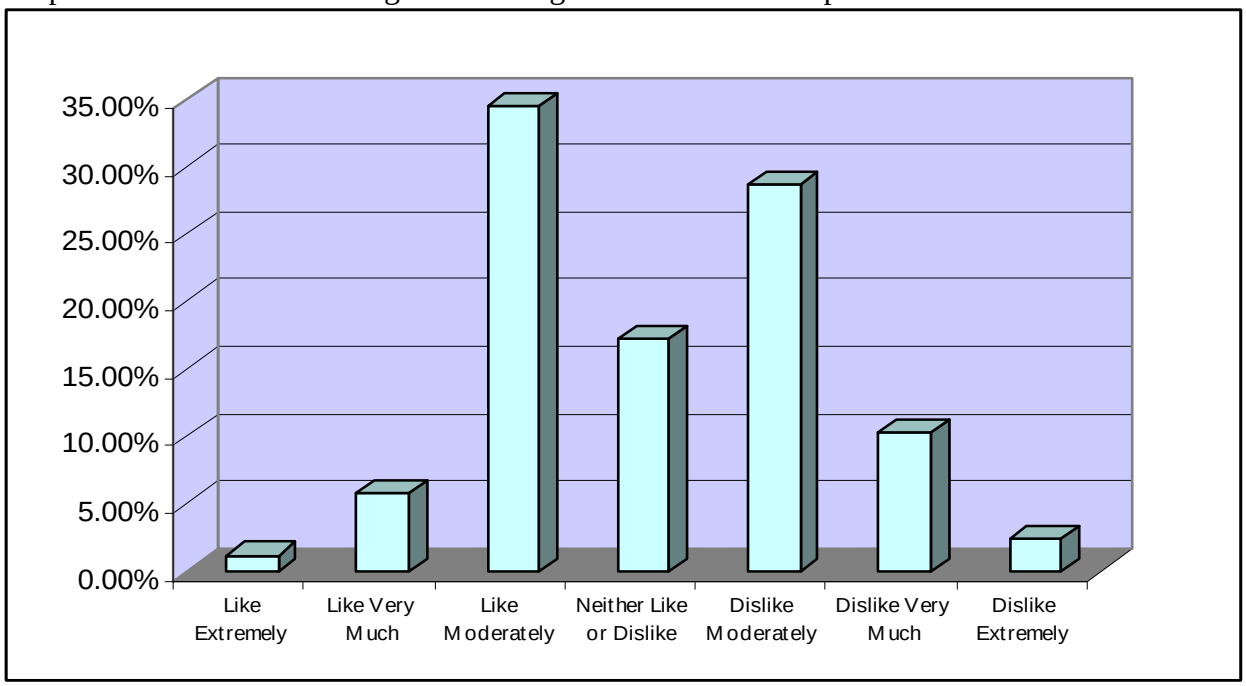
Table 2. Sensory Test Results (% selected with majority highlighted) for Sample #967

								
Code 967	**Like Extremely (%)**	**Like Very Much (%)**	**Like Moderately (%)**	**Neither Like or Dislike (%)**	**Dislike Moderately (%)**	**Dislike Very Much (%)**	**Dislike Extremely (%)**	**Total (%)**
Taste	0	3.45	34.48	17.24	34.48	10.34	0.00	100.00
Texture	0	6.90	27.59	17.24	27.59	13.79	6.90	100.00
Sweetness	3.45	6.90	37.93	17.24	27.59	6.90	0.00	100.00

Table 3. Total Sensory Test Results (Taste + Texture + Sweetness) for Sample #967

Code 967	Responses	Percentage (%)
Like Extremely	1	1.15
Like Very Much	5	5.75
Like Moderately	29	34.48
Neither Like or Dislike	15	17.24
Dislike Moderately	26	28.74
Dislike Very Much	9	10.34
Dislike Extremely	2	2.30
Total	87	100.00

Graph 1. Hedonic Scale Rating for Non-vegan Brownie for Sample #967



Results for sample #242 - Vegan brownie suitable for diabetics – with tofu

Table 4. Sensory Test Results (Responses) for Sample #242

								
Code 242	**Like Extremely**	**Like Very Much**	**Like Moderately**	**Neither Like or Dislike**	**Dislike Moderately**	**Dislike Very Much**	**Dislike Extremely**	**Total**
Taste	1	0	10	5	8	3	2	29
Texture	1	7	15	0	4	1	1	29
Sweetness	1	3	6	8	5	6	0	29
Total	3	10	31	13	17	10	3	87

Table 5. Sensory Test Results (selected with majority highlighted) for Sample #242

								
Code 242	**Like Extremely (%)**	**Like Very Much (%)**	**Like Moderately (%)**	**Neither Like or Dislike (%)**	**Dislike Moderately (%)**	**Dislike Very Much (%)**	**Dislike Extremely (%)**	**Total (%)**
Taste	3.45	0.00	34.48	17.24	27.59	10.34	6.90	100.00
Texture	3.45	24.14.	51.72	0.00	13.79	3.45	3.45	100.00
Sweetness	3.45	10.34	20.69	27.59	17.24	20.69	0.00	100.00

Table 6. Total Sensory Test Results (Taste + Texture + Sweetness) for Sample #242

Code <u>242</u>	Responses	Percentage (%)
Like Extremely	3	3.45
Like Very Much	10	11.49
Like Moderately	31	35.63
Neither Like or Dislike	13	14.94
Dislike Moderately	17	19.54
Dislike Very Much	10	11.49
Dislike Extremely	3	3.45
Total	87	100.00

Graph 2. Hedonic Scale Rating for Vegan Brownie for Sample #242

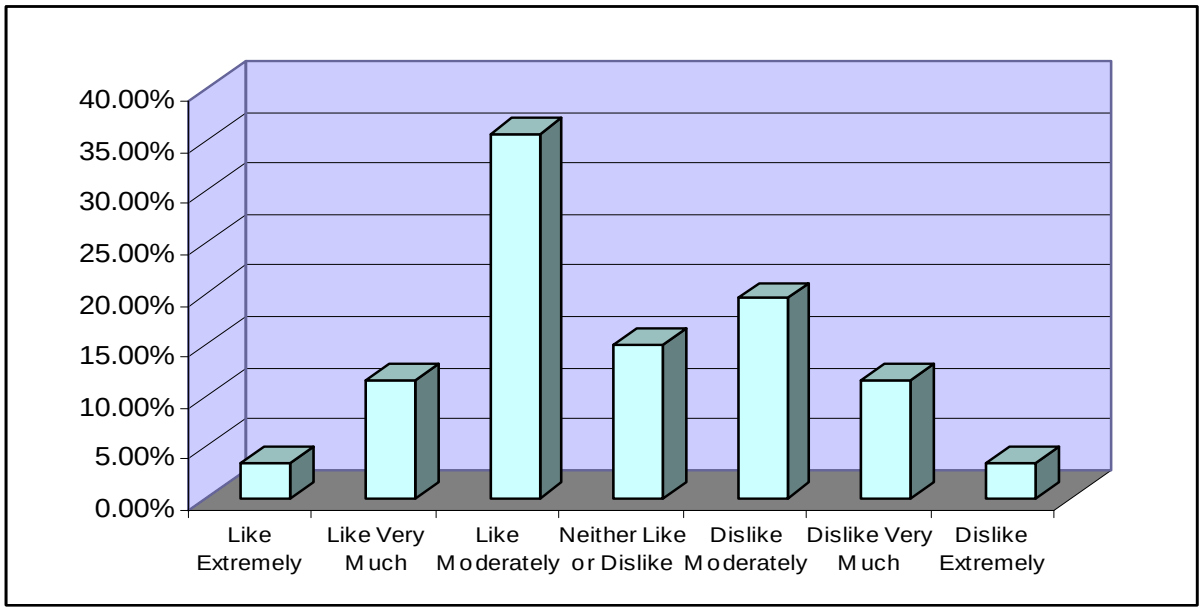
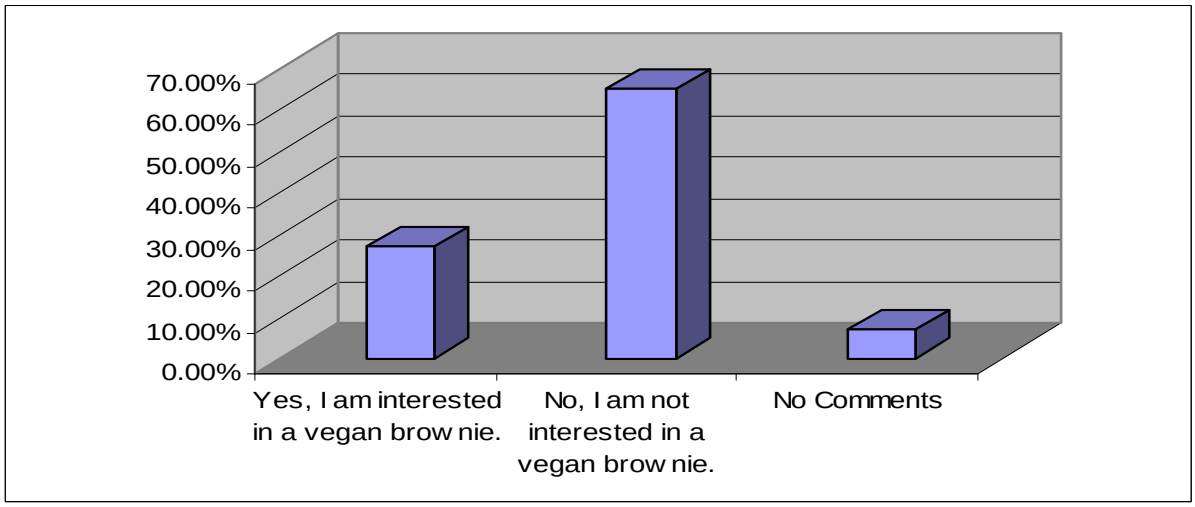


Table 7. Vegan Brownie Preference

	Responses	Percentage (%)
Yes, I am interested in a vegan brownie.	8	27.59
No, I am not interested in a vegan brownie.	19	65.52
No Comments	2	6.90

Graph 3. Vegan Brownie Preference Result



Quantitative Analysis:

We obtained a sample of 31 random people from the CSUN population but since 2 participants did not fill out our evaluation form completely we disregarded their forms and based our calculations on 29 participants.

The first sample brownie "967" was the non-vegan brownie suitable for diabetics. The results indicated a tie between *like moderately* and *dislike moderately* with a percentage of 34.48% for taste, and again a tie was shown between *like moderately* and *disliked moderately* for the texture with a 27.59% score and a peak of 37.93% for sweetness. The average result of the overall brownie was 34.48% and still in the *liked moderately* range. Only 1.15% of the sample *liked extremely* the brownie, with 2.30% who marked *dislike extremely*.

The sample "242" was the vegan brownie (which contained no animal products) suitable for diabetics. The overall result was found in the *like moderately* range with a percentage of 35.63%; individual characteristics scored in the *like moderately* range with 34.48% for taste, peaked with the texture in the *like moderately* range with 51.72% and only in the *neither like or dislike* area with a 27.59% for sweetness. The sensory test results tied in the overall hedonic 7 point scale in the *like extremely* and *disliked extremely* category with 3.45%.

Comparing the brownies to each other, the vegan brownie 242 had a higher overall positive response in the *like extremely* to *like moderately* range, with a total of 50.57% compared to 41.38 % the non-vegan brownie 967. Also, almost 80% of panelists enjoyed the texture in the *like extremely* to *like moderately* range compared to 35% in respect to the non-vegan brownie. In the sweetness category, the non-vegan brownie in the above mentioned range scored 48.28% compared to 34.48% for the vegan brownie, and the products tied in the taste category with almost 38%. From this we can conclude that we achieved a good texture for our vegan product but our product lacked the expected brownie taste and sweetness.

Qualitative Analysis:

A qualitative question was offered to the respondents asking them if they would be interested in a vegan brownie. The 65.52% of the group responded that they were not interested in a vegan brownie.

Package Design

We selected a small box from Panera Bread bakery. This packaging will protect the brownies during display, transportation, and storage, as well as protect them from environmental factors. The square box (7”x7”x3”) is simple: no designs, brown cardboard on the outside, and white on the inside. This earthy look of simplicity conveys environmental responsibility as it is 100% recycled material. A small plastic window in the front allows for viewing the product. For an extra holiday touch, we added a colorful ribbon around the box and matching craft paper inside to create depth. The consumer will enjoy a healthy, delicious treat in an attractive container, while being kind to Mother Nature.

La Petite Brownie

11/24/2009

Nutrition Facts

Serving Size (71g)
Servings Per Container 12

Amount Per Serving

Calories 140 Calories from Fat 70

	% Daily Value*
Total Fat 8g	**12**%
Saturated Fat 3.5g	**18**%
Cholesterol 0mg	**0**%
Sodium 75mg	**3**%
Total Carbohydrate 16g	**5**%
Dietary Fiber 4g	**14**%
Sugars 3g	
Protein 4g	

Vitamin A 30% • Vitamin C 8%

Calcium 8% • Iron 15%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

La Petite Brownie

November 24, 2009

Total Weight: 851.92 g (30.05 oz-wt.)
Serving Size: 70.99 g (2.50 oz-wt.)
Serves: 12.00
Cost: --

Foodlist

Amount for 12 servings	Food Item	Amount for 1 serving	Cost	ESHA Code
150 g	Soft Silken Tofu-Slc MNF-MN	12.5 g	--	7541
50 g	Xylitol Sweetener	4.16667 g	--	
20 g	Truvia	1.66667 g	--	
15 g	Splenda No Calorie Sweetener	1.25 g	--	
22 ml	Vanilla Extract	1.83333 ml	--	26624
30 ml	Flaxseed Oil	2.5 ml	--	44716
20 g	Cocoa Powder Unsweetened-Dry	1.66667 g	--	28200
10 g	Double Acting Phosphate Baking Powder	0.83333 g	--	28046
116 g	Unsweetened Baking Chocolate-Square	9.66667 g	--	23010
100 g	Fresh Carrots-Grated	8.33333 g	--	5046
110 g	Organic WhlGrn SftWht PastryFlour HCG-AM	9.16667 g	--	38444
214 g	Unsweetened Applesauce w/+VitC-Cnd	17.8333 g	--	3330

Nutrients per Serving

Calories	140.04	Fat - Total	8.10 g
Protein	3.51 g	Saturated Fat	3.53 g
Carbohydrates	15.82 g	Vitamin A RE	139.52 mcg
Dietary Fiber	3.54 g	Vitamin C	4.27 mg
Cholesterol	0 mg	Sodium	75.32 mg
% Calories from fat	47 %	% Calories from carbs	41 %

Multi-Column

Basic Components		A - Carotenoid	139.52 RE	Copper	0.41 mg
Calories	140.04	A - Retinol	0 RE	Iodine	-- mcg
Calories from Fat	72.94	Thiamin-B1	0.31 mg	Iron	2.27 mg
Calories from Saturated Fat	31.74	Riboflavin-B2	0.05 mg	Magnesium	45.60 mg
Protein	3.51 g	Niacin-B3	0.57 mg	Manganese	0.50 mg
Carbohydrates	15.82 g	Vitamin-B6	0.02 mg	Molybdenum	0.42 mcg
Dietary Fiber	3.54 g	Vitamin-B12	0 mcg	Phosphorus	145.56 mg
Sugar - Total	2.55 g	Biotin	0.42 mcg	Potassium	198.10 mg
Other Carbs	8.31 g	Vitamin C	4.27 mg	Selenium	1.08 mcg
Fat - Total	8.10 g	Vit E Alpha-Tocopherol	0.53 mg	Sodium	75.32 mg
Saturated Fat	3.53 g	Folate	5.00 mcg	Zinc	1.14 mg
Mono Fat	2.16 g	Folate DFE	5.00 mcg	**Other**	
Poly Fat	1.88 g	Vitamin K	2.08 mcg	Alcohol	0.55 g
Trans Fatty Acids	0 g	Pantothenic Acid	0.06 mg	Caffeine	11.57 mg
Cholesterol	0 mg	**Minerals**		Choline	5.36 mg
Vitamins		Calcium	86.71 mg		
Vitamin A RAE	69.76 mcg	Chromium	0.03 mcg		

La Petite Brownie

November 24, 2009

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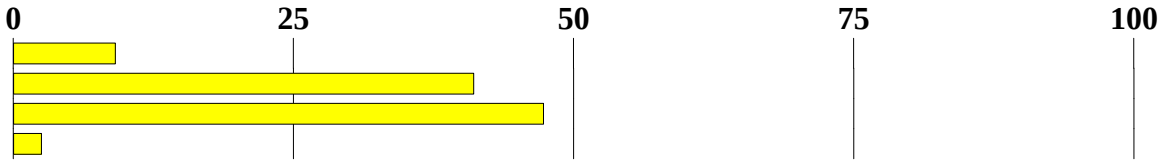
Serving Size: 70.99 g (2.50 oz-wt.)
Serves: 12.00
Cost: --

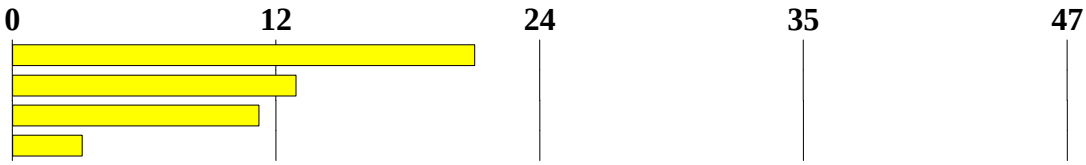
Ratios and Percents

Source of Calories



Protein	9%
Carbohydrates	41%
Fat - Total	47%
Alcohol	3%

Source of Fat



Saturated (7 - 10%)	21%
Mono Unsat (10 - 15%)	13%
Poly Unsat (up to 10%)	11%
Other/Missing	3%

Exchanges

Bread / Starch:	0.4	Fruit:	0.1
Other Carbs / Sugar:	0.2	Vegetables:	0.1
Very Lean Meat / Protein:	--	Milk - Skim:	--
Lean Meat:	0.1	Fat:	1.3

Ratios

P : S (Poly / Saturated Fat)	0.53 : 1
Potassium : Sodium	2.63 : 1
Calcium : Phosphorus	0.60 : 1
CSI (Cholesterol / Saturated Fat Index)	3.56

La Petite Brownie

November 24, 2009

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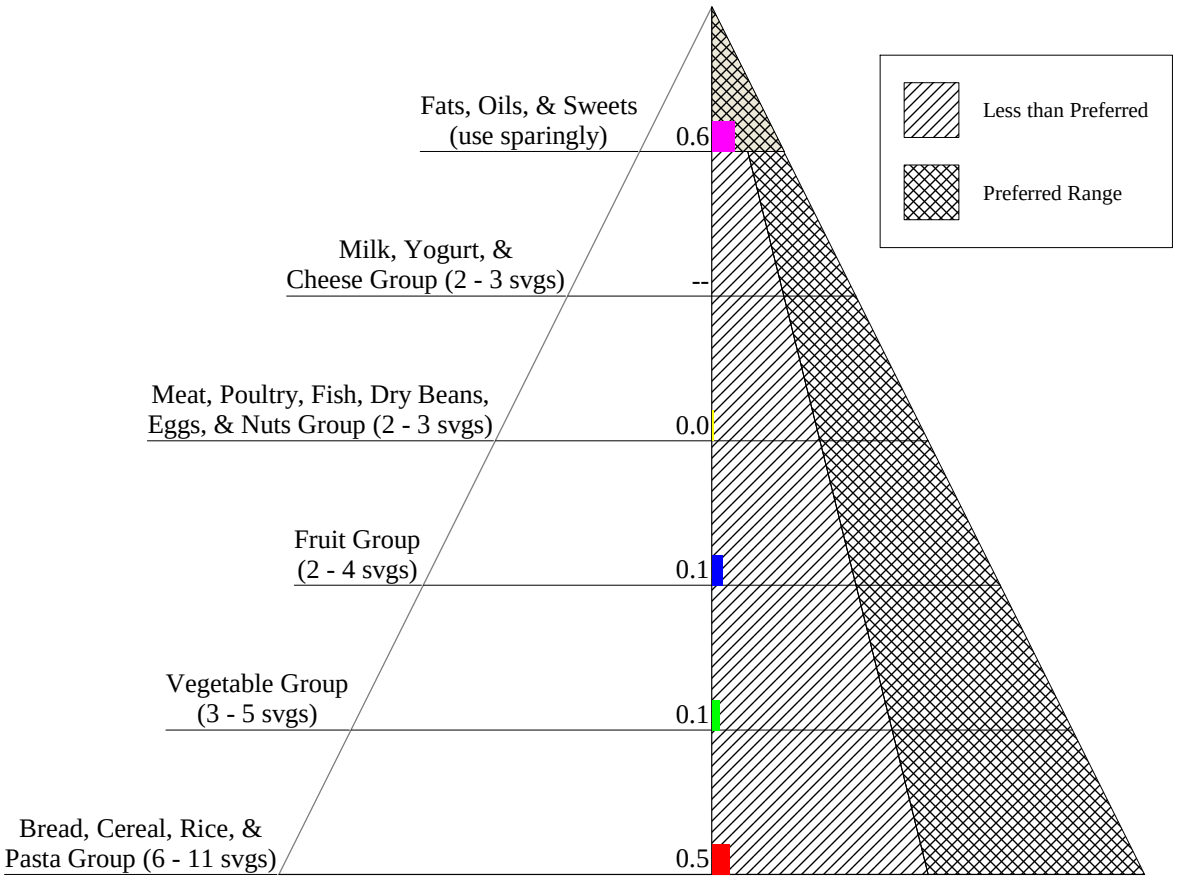
Food Pyramid

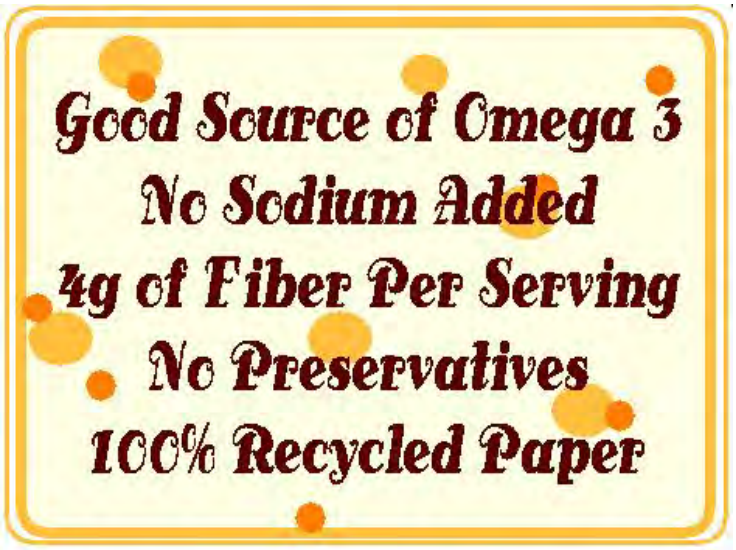


LA PETITE BROWNIE COST SHEET

	C	D	E	F	G	H	I	J	K	L
LA PETITE BROWNIE		**AMOUNT NEEDED**		**MARKET UNIT SIZE**		**# / MARKT UNIT**	**Mkt. Unit**	**Ingred. Cost**	**Total recipe**	**Cost / serv.**
PRODUCT	**DESCRIPTION**	**QTY**	**UNIT**	**QTY**	**UNIT**	**(F / D)**	**Cost**	**I / H**	**Cost**	**K / # serv**
									(Sum of J)	**12**
Soft Silken Tofu	White	150	g	396.00	g	2.64	$ 1.69	$ 0.64	**$ 8.58**	**$0.72**
Xylitol	White	50	g	240.00	g	4.80	$ 7.99	$ 1.66		
Truvia	White	20	g	280.00	g	14.00	$ 6.99	$ 0.50		
Splenda	White	15	g	50.00	g	3.33	$ 4.39	$ 1.32		
Vanilla Extract	Brown	22	ml	236.00	ml	10.73	$ 1.49	$ 0.14		
Flaxseed Oil	Oil	30	ml	250.00	ml	8.33	$ 8.19	$ 0.98		
Cocoa Powder	Unsweetened	20	g	226.00	g	11.30	$ 3.99	$ 0.35		
Baking Powder	Double acting	10	g	284.00	g	28.40	$ 2.29	$ 0.08		
Baking Chocolate	Unsweetened	116	g	226.00	g	1.95	$ 3.49	$ 1.79		
Carrot	Fresh	100	g	907.00	g	9.07	$ 1.29	$ 0.14		
Whole Wheat Flour	Pastry	110	g	2.00	lb	0.02				
		110	g	907.18	g	8.25	$ 3.09	$ 0.37		
Apple Sauce + Vit C	Unsweetened	214	g	1360.00	g	6.36	$ 3.79	$ 0.60		

Package Design


La Petite
Brownie
Brownies suitable for Diabetics


Good Source of Omega 3
No Sodium Added
4g of Fiber Per Serving
No Preservatives
100% Recycled Paper

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Serving Size (71g)
Servings Per Container 12

Amount Per Serving
Calories 140 Calories from Fat 70

	% Daily Value*
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Protein 4g	

Vitamin A 30% • Vitamin C 8%

Calcium 8% • Iron 16%

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Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Ingredients: Tofu, Organic Pastry Flour, Baker's Chocolate (unsweetened), Apple Sauce(unsweetened), Carrots, Xylitol, Hershey Chocolate Cocoa Powder, Splenda, Fiber, Baking Powder, Flaxseed Oil, Truvia, Vanilla Extract.