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## **Planning Report for Tuna Apple Crisp Modification**

### ***Objective:***

The objective of the experiment is to determine if healthy modifications can be made to a Tuna Apple Crisp without compromising taste, texture and overall visual appeal. We will use whole wheat flour instead of white flour and substitute Splenda for regular sugar.

### ***Hypothesis:***

By substituting whole wheat flour and Splenda we will be able to keep the taste, texture, and overall visual appeal while making it healthier. These changes will make a product with fewer calories, a higher amount of fiber, and an overall healthier dessert.

### ***Literature Review and Rational:***

The prickly pear fruit is seemingly a diamond in the rough. Despite its thorny exterior, this fruit contains a natural liquid sweetener and some very important health benefits.

We chose the prickly pear after conducting a rapid analysis of the data collected regarding the perception of ethnic produce among farmer's market consumers. It was clear that the prickly pear was not a popular fruit because only 16 out of 133 people have ever tasted the prickly pear cactus. We also wonder whether this fruit is more commonly consumed by ethnic groups because the majority of consumers interviewed were white. Our rapid analysis also taught us that the majority of people only spent \$10-19 at the

farmer's market. It is possible the prickly pear is just too expensive or requires too much preparation time to even consider purchasing. These questions all relate to our decision to choose the prickly pear. Through our prickly pear recipe, we hope to teach people the health and taste benefits of the prickly pear.

In order to create and modify our Tuna Apple crisp, it was important for us to learn more about the fruit so we could choose ways to modify it. From the five articles we chose, we learned just how special this fruit is, reasons why people would be interested in using the prickly pear, and ways we can modify our own recipe to make it healthier.

Our first article, "Cactus Pear Fruit: A New Source for Natural Sweetener," taught us through sensory evaluation that the relative sweetness of the prickly pear is similar to that of glucose syrup and lower than fructose. By utilizing the naturally sweet syrup of the prickly pear, it is possible that less sugar will have to be used in making our crisp.

The second article, "Consumer Perception and Choice of Minimally Processed Vegetables and Packaged Fruits" investigated consumer decision-making process toward minimally processed vegetables and packaged fruits. This study concluded that the motivation for purchasing minimally processed vegetables relates to convenience and speed. Health and nutrition were not as important and freshness and taste were of high importance when buying or consuming products. This article is important to our food development project because it can help us understand why people buy or do not buy the prickly pear and ways we can help make it more popular. Since speed and convenience are important, the prickly pear is ultimately not the best choice because of the time it takes to prepare it. Since freshness and taste were also of high importance, we can hope

that by creating a tasty desert with the prickly pear, people will be more inclined to purchase the fruit because it tastes good. Lastly, nutrition and health were of low importance. If we can educate consumers on the health benefits of this fruit, we hope that they will buy it for its delicious taste and nutrient values.

Our third article, "Prickly Pear Cactus," discussed the health benefits of the prickly pear. These benefits include rich source of flavonoids, plant pigments and antioxidants. The cactus pods also add a source of vitamin C, beta carotene, and fiber. If consumers learn about the health benefits of the prickly pear and are able to enjoy these benefits by consuming a delicious crisp, we hope that they will be more inclined to purchase and utilize this fruit.

Our fourth article, "How to Cut and Prepare a Prickly Pear" describes the process of preparing a prickly pear. Although it can be a time consuming process when learning, we hope that educating people on how to prepare it and how delicious it can taste once cooked, they will have a new outlook on the fruit and be up to the challenge of preparing it.

Our final article, "Baking with Sugar Substitutes," gives advice on how to substitute sugar with artificial sweeteners. In our recipe, we plan on substituting sugar with Splenda. By altering our recipe, we hope to create a delicious crisp that maintains its sweetness but has fewer calories.

### ***Methods:***

#### ***Product to be modified:***

In this experiment we are manipulating the ingredients in the Tuna Apple crisp recipe. The ingredients in the recipe that we are manipulating are sugar and white flour.

In this experiment, we will be substituting Splenda for sugar and whole wheat flour for white flour. We chose to use Splenda in this recipe because it works in baking and cooking. Also, Splenda has no affect on the levels of sugar in the blood, and is considered a “free food” for diabetics because Splenda is a non-carbohydrate sweetener. We chose to use whole wheat flour in this recipe because whole grains are better for your health than processed grains. Whole wheat flour is a good source of fiber, and has many important vitamins and minerals. Whole wheat flour has many health benefits including a decreased risk of heart disease. Throughout the treatments in this experiment we will test the texture, sweetness, and consumer acceptance. In this experiment, we are trying to make a healthier product that is still a good quality product.

***Independent and Dependent Variables:***

In this experiment the independent variables include the amount of whole wheat flour, and the amount of Splenda. The dependent variables in the experiment are texture, sweetness, and consumer acceptance.

***Treatments:***

We are going to be doing four different sets of treatments. The first one will be our control group which will be the regular recipe with all-purpose flour and sugar. The second treatment will be with all-purpose flour but instead of using sugar; we will be substituting it with Splenda sweetener. The third treatment group we will be doing will be with whole wheat flour instead of all-purpose flour and with sugar. The fourth group we will be doing will be with whole wheat flour instead of all-purpose flour and with Splenda instead of sugar.

	#1 Control 100% White Flour 100% Sugar	#2 100% White Flour 100% Splenda	#3 100% Whole Wheat Flour 100% Sugar	#4 100% Whole Wheat Flour 100% Splenda
Fruit Pudding:				
Prickly Pear Cactus Tunas	20-25 tunas	20-25 tunas	20-25 tunas	20-25 tunas
McIntosh Apples	2 apples	2 apples	2 apples	2 apples
Sugar (g)	150	0	150	0
Splenda (g)	0	18	0	18
Apple Pie Spice (g)	2.4	2.4	2.4	2.4
Mace (g)	0.88	0.88	0.88	0.88
All-purpose Flour(g)	23.4	23.4	0	0
Whole Wheat Flour(g)	0	0	22.5	22.5
Pecans(g)	60	60	60	60
Topping:				
Brown Sugar(g)	165	165	165	165
Sugar(g)	50	0	50	0
Splenda(g)	0	6	0	6
Cinnamon(g)	2	2	2	2
All-purpose Flour(g)	125	125	0	0
Whole Wheat Flour(g)	0	0	120	120
Butter(g)	113.5	113.5	113.5	113.5

***Food product preparation procedure:***

We will be preparing our product with four different treatments. For the first treatment we will prepare the tunas and apples into slices similar to those that would go in a pie. We would then add 150g of sugar, 2.4g of apple pie spice, 0.88g of mace, 23.4g of white flour, and 60g of chopped pecans. We will then mix all of these together and set aside. Next we will mix the topping which involves; 165g of brown sugar, 50g of sugar, 2g cinnamon, and 125g of white flour. Then we will cut 113.5g of butter into the topping

mixture until it looks like cornmeal. We will spread this mixture over the top of the fruit mixture and bake in the oven at 325°F for about 45 minutes to one hour. We will know that the crisp is done when the fruit is bubbling and oozing around the edges of the topping.

For the other treatments we will be preparing the Tuna Apple Crisp in the same way except for the second treatment we will be using Splenda instead of the sugar. For the third treatment we will be using wheat flour instead of white flour. For the fourth treatment we will be using wheat flour instead of white flour and Splenda instead of sugar.

### ***Evaluation Methods:***

The objective method we will evaluate is the texture of our product. We will be preparing a crisp using prickly pear cactus fruits (Tunas) and apples. We will measure the texture of our completed product by using a penetrometer.

We will use two sensory evaluation tests. The first will be the Duo-Trio Discrimination Test. We will be substituting whole wheat flour for white flour, and Splenda for sugar. Using a Duo-Trio Test we will be able to see if there is a difference between the products. Second we will use Quantitative Descriptive Analysis when testing our products on trained panelists.

### ***Potential Biases:***

There are several potential biases that may impact the objective nature of the experiment. First, we don't know if the tasters like Splenda. Some people may detect and not like the taste of artificial sweeteners and thus, their opinion may be biased. Second, the taste of the prickly pear cactus fruit may be new to people and their reaction to it may

skew the results. Third, the whole wheat flour may change the properties of our product (i.e. make it more or less tender) and the difference might skew people's choices. Finally, the changes we make to the recipe may not change the product very much at all, which again, may bias their opinions.