Title: The Effect of Milk Fat Content on the Texture and Palatability of a Gummy Roll-up Snack Made With Milk.

Hypothesis and Objectives: Which milk fat content will produce a roll-up snack with the best texture and palatability?

Null Hypothesis: The milk fat content of the milk used in a roll-up snack will not have an effect on the texture or palatability of the snack.

The independent variable is the milk fat content and the milk fat contents that are going to be used are 0%, 2%, and whole milk (3.7%). The dependent variables that are going to be measured are texture, more specifically the firmness of the product, the color, and the preference of a taste panel.

The objectives of this experiment are to create a flavored roll-up snack that uses milk instead of fruit juice, to add nutritional value by using milk rather than various gums and starches, and to make a product that is shelf stable even with a large amount of milk in the formula.

Background: The main reason this experiment was conceptualized is that it is known that the American population, especially children and teens, does not get enough calcium in their diets. According to an article in Food Technology (Ohr), 30% of children ages 1-5, 70% of preteen girls, 60% of preteen boys, 90% of teenage girls and 70% of teenage boys are not meeting the calcium needs for their bodies. This is eventually going to affect their bones negatively as American children age.

To help curb this problem of minimal calcium intake, the fruit juice in a roll-up snack is going to be replaced with milk. Ideally, if the experiment works, one roll-up snack will have as much, if not more, calcium as one glass of milk. Gummy products are very popular with American children and this re-formulation of a gummy snack will hopefully both work and be appealing (Pszczoła, 2004). It has been shown that using an 80% protein concentration that is mainly whey protein, can take the place of gelatin in a gummy candy. (Pszczoła, 2002)

From the research that has been conducted, it has been found that a gummy snack is more of a project in the confectionary area than any other area (Pszczoła, 2004). This being said, the product is going to be created and the experimental and testing procedures are going to be developed as if it were are candy even though it is meant to be a food of added nutritional value.

A roll-up version of a gummy snack has been chosen rather than the molded version to encourage the product to dry quickly by using a dehydrator rather than heating the product first and then letting it sit in a mold for several hours. The milk may have a water activity that is too high to allow gelling of the product alone therefore, a dehydrator would be integral in pulling much of the water out of the product. The sugar and cornstarch in the product should help to bind up much of the water in the mixture before it is put in the machine.
It is important that the color of the snack be in line with the flavor. Therefore, there has been some thinking about the effects that the methods of this experiment will have on the color of this item. Maillard browning is almost certain in this experiment considering the presence of sugar in the forms of natural lactose and added sucrose, and also the protein in the milk. The product will be dried in a food dehydrator which will heat the product and remove water, both of which are catalysts to the Maillard browning reaction (Scheule and Bennion). To make sure this browning does not negatively affect the perception by the taste panel, and to also add flavor to the product, cocoa will be added which should mask any natural browning and yield a palatable product when combined with the large amounts of natural and added sugar in the formula. If the cocoa does not work initially, a caramel flavoring may be added instead which would play off of the caramelized and toasty flavor notes produced by the Maillard reaction.

This reaction is not a huge concern because often, milk products are added to confectionary creations to produce this very same reaction that will most likely occur in the product (Clark). It helps to add subtle layers of flavor and it would be nice to have a proportional amount of this reaction in the product as to give it just a light layer of flavor. Browning is not a very large dependent variable in this experiment, so color will not be tested. However, it is of utmost importance that the product tastes good and is soft and chewable. That is the purpose for testing methods that include texture analysis, water activity and sensory panels (Duxbury). According to research, fat can be very important in a confectionary product, as it can help add softness to a product as well as mouth feel (Pszczola, 2004). This adds confidence to the experiment, that the independent variables are going to be critical in the outcome of the product in the case of texture and taste panel preference.

Approach:
The recipe that is going to be used is from a professor in the food science department and has been used in introductory processing classes. It is actually a fruit snack recipe and the formula is in percent by weight which is standard for industry recipes. It is listed below.

Milk – 70%
Corn starch – 7%
Corn syrup – 7%
Sugar – 13%
Color and flavor – 3%

This recipe is going to be made 500g at a time and the recipe in grams is as follows.

Milk (0%, 2%, 3.7%) – 350 g
Corn starch – 35g
Corn syrup – 35g
Sugar – 65g
Color and flavor (cocoa powder) – 15g

When it comes time to mix the ingredients, they will all be missed into a room temperature bowl and mixed until all ingredients are homogenous but the mixture will
not be stirred for more than a minute. Once the mixture is ready, it will be poured into a food dehydrator tray that has been lined with plastic wrap and will be allowed to dry at around 140 degrees F for six to eight hours. The mixture will be tapped on the counter to remove air bubbles and to even out the layer of product. The experiment will be started at 8am on the assigned days which is before the lab actually starts, but that is so the product can be observed during the actually experiment time to make sure drying is occurring. The way other variables are going to controlled is to use utensils all at the same temperature and the milk will be strait out of the refrigerator.

After the product is made, it will be tested for both texture and water activity. Both attributes will be compared to a roll-up fruit snack that is currently on the market. There will also be a sensory evaluation done with a taste panel. The sensory evaluation is attached.

Work Plan:
8am – Prep utensils and prepare area and ingredients. Set up dehydrator.
8:30 – read procedures over once for thoroughness and then mix ingredients for all three variables.
9 – pour mixtures into dehydrator and set timer. Watch to make sure nothing is wrong and clean up.
9:20 – Leave for class.
10:30 – check on dehydrator and see if changes need to be made.
11:00 – help others if they need help and wait for product to continue drying.
3:30 – come back after class and check on product. If ready, take out of dehydrator and complete texture analysis, color measure and consumer panels with people on campus.

This plan will be repeated if successful and altered if more time is needed in the dehydrator.

References:


Sensory Evaluation

Please taste each sample in front of you.

On the scale below please mark the line that best describes each gummy snack

502

239

797

Ranks the samples in order of preference. 1 being the one you like most and 3 being the one you like least.

502 _______

239 _______

797 _______

Comments: