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The Effect of Tic caragum powder on Texture and Palatability of Low-Fat French Onion Dip

Abstract:  
The problem facing Americans today is obesity. One method to reduce this obesity epidemic is to restrict calorie intake. Decreasing the fat intake of Americans has been a proven way to help reduce the overall intake of calories. This experiment is designed to make a low fat French onion dip have a similar texture and palatability of higher fat French onion dip so that more people would prefer the low fat dip without adding extra calories to improve texture. By adding Tic caragum to the low fat dip it created a more viscous dip. Subjectively however, thirty-eight panelists determined that overall, if anything, adding this gum to dip it makes it less palatable. People preferred low fat, high fat, and low fat with caragum dips almost equally. These are positive yet unexpected results because people are willing to consume lower fat foods without sacrificing taste.

Introduction:  
The purpose of this experiment is to test Tic caragum powder as a way to improve the mouthfeel and texture of low-fat French onion dip. A decrease in the fat intake among Americans can have a profound effect on reducing overall caloric intake which will lead to a reduction in obesity and risk of chronic diseases (American Dietetic Association). The problem is that in general most people prefer to eat dairy products with higher fat content because they have a better overall texture and mouthfeel.

Fat serves many functions in food such as: structure, flavor, creaminess, viscosity, tenderness, and opacity. When the fat content in a dairy product is reduced, some if not all of these components may be affected. The effects that fat removal has specifically on sour cream are reduction in flavor, more watery, less creamy, translucent, and less stable (Miraglio 1995). Fat replacers or fat substitutes have been used to make low-fat products into better tasting and more preferable foods. These sensory qualities are important to the dairy industry because product quality and consumer acceptance are two influences on
the sales of their products (Phillips 1995). A fat replacer should improve the texture, mouthfeel and functionality of fat in low-fat foods (Ohmes 1998). Fat replacers may be the answer to making low-fat foods sell as easily as their higher fat competition.

Another issue is the importance of calcium in the diet. Calcium plays an important role in bone density and also in reduction of cardiovascular disease (Zemel 2004). Dairy products are an excellent source of calcium in the diet, but along with this nutrient comes saturated fat. Low-fat dairy products obviously have less calories then regular dairy products, but also retain a significant amount of calcium. If low-fat dairy products tasted and had a similar mouthfeel as regular ones, people could still get the calcium they need without unnecessary fat calories.

Overall, if a low-fat dip had the same physical characteristics of regular dips, then the product would be one lower in calories, still nutritionally sound, and preferable to the general public.

The objective of this experiment is to make a low-fat French onion dip that is indistinguishable from regular-fat French onion dip in texture, mouthfeel, and taste using the product Tic caragum powder. The independent variable of this experiment is the amount of fat in the dip. One dip will be made with regular cream cheese and sour cream and two dips will be made with low-fat cream cheese and non-fat sour cream. One of the low-fat dips will contain the Tic caragum powder (a product that creates perception of creaminess in reduced fat or no fat products). The dependent variable that will be measured is texture; using a Brookfield viscometer and a texture analyzer. Also, a sensory panel (38 subjects) will be used to determine the mouthfeel and preference of the products.
Methods:

The dips will be prepared according to the recipe and be put in the refrigerator for at least 4 hours. The original recipe can be found on wikipedia.com:

226g – Kraft Philadelphia Cream Cheese – Original
226g – Daisy Original Sour Cream
1 package (28.35g) of Lipton Recipe Secrets – Onion soup mix

The first dip will follow this recipe exactly. The second dip will require low fat cream cheese (Kraft Philadelphia) and fat-free Daisy sour cream (226g of each) instead of the original cream cheese and sour cream. The third dip will be the same recipe as the second, except .50 g of Tic caragum powder will also be added. All of the dips will be mixed for 2 minutes each with an electric mixer. The ingredients will be refrigerated before the dips are made and also after they are done the dips will all be refrigerated for 4 hours. The dips will be placed in 5 g quantities into six sample cups (two of each of the three dips) and labeled in three digit randomization code. The high fat dips will be labeled with the numbers 491 and 145. The low fat dips will be labeled as 345 and 798. The third dip (with the gum) will be labeled as 566 and 925. The subjective methods (taste panel for mouthfeel, texture, and taste) will be tested using a sensory evaluation form by thirty-eight subjects:
**Sensory Evaluation**

Please taste all six samples in front of you.
Please indicate which statement best describes your opinion of the mouthfeel of each sample.

Extremely Creamy = 5
Moderately Creamy = 4
Average Creaminess = 3
Slightly Creamy = 2
Not Creamy = 1

345: ____
798: ____
566: ____
491: ____
925: ____
145: ____

Please describe the texture of each sample in a couple words:

345: 491:

798: 925:

566: 145:

Rate the samples one, two, three, four, five, and six (one number for each sample) based on your overall like or dislike of the product. One being the one you liked the most and six being the one you liked the least.

345: 491: _________
798: 925: _________
566: 145: _________
The objective methods (Brookfield viscometer and texture analyzer) will be tested on all three dips three times. The dips will be put in a 250 milliliter beaker filled to the top and leveled off with a knife. Using the number seven spindle on the Brookfield viscometer, the dip will be tested at both 6 rpm and 12 rpm. Once the motor is turned on, the viscosity will be recorded exactly two minutes later. Each dip will be tested three times. Then the dips (still in the beaker) will be tested with the texture analyzer using the cone shaped probe. The grams of force will be recorded three times.

Discussion:

The purpose of this project is to create a low-fat French onion dip that had the same texture and palatability of a higher fat French onion dip. However, the results produced were particularly interesting. In Figure 2, it shows that the majority of panelists would agree that high fat dip is moderately creamy because nearly half of the panelists rated it as such. In Figure 3, it can be noticed that subjective ratings of low fat dip are not really consistent because the ratings do not indicate that the general public would agree on the creaminess level of it. In Figure 4, 15 panelists rated the low fat dip with Tic caragum as moderately creamy, but 11 panelists rated it as average creaminess and 9 rated it as extremely creamy. These results are not very consistent either. As it can be seen in Figure 1, the average subjective ratings of mouthfeel for the three types of dips are very similar. Overall, all three dips were rated on average between 3 and 4 indicating that all three dips were somewhere in between average and moderate creaminess. This would indicate that people do not seem to notice a difference in the creaminess between high fat, low fat and low fat with Tic caragum dips.
Sensory properties are extremely important to the dairy industry because research has shown that the appearance of dairy products actually affects the overall likeness of a product more than the fat content of it (Phillips 1995). In the future, the appearance of the dips should probably be subjectively tested to see if this has an effect on the perceived mouthfeel.

As for the overall likeness of the dips, turn to Figure 6. In this diagram, it shows that overall, the low fat dip was actually preferred by more people. The high fat dip and low fat dip with Tic caragum powder dips were ranked the same. Statistically, however, the three dips were not overall much different (as shown in Figure 5). Here it can be seen that low fat dip was preferred only slightly more than the other two. The standard deviations of these data are very large. This indicates there was a lot of variation in the data collected. Again, this shows that the panelists were not consistent in which dip was overall preferred. Subjectively, this experiment does not show much of a difference in the palatability of French onion dip with different amounts of fat. Therefore, people should use lower fat products when making French onion dips because this data shows that people overall will not prefer it any less. It has been shown that foods high in fat have a poor effect on satiation, with can lead to over consumption of energy intake. The first stage in a health program should be to prevent over consumption of energy intake (Blundell 1997). These are positive yet unexpected results because people are willing to consume lower fat foods without sacrificing taste.

Objectively, the dips were tested for viscosity and grams of force (via texture analyzer). In Figure 7, it shows that the viscosity of the low fat dip with Tic caragum powder had the greatest viscosity. This means that less Tic caragum powder should have
been used because the goal was to match the viscosity of high fat dip. But according to the data collected, the low fat dip already has a similar viscosity to that of high fat French onion dip. So, this type of dip does not really need any Tic caragum powder to improve the texture, because there already is not a big difference. In Figure 8, it shows the results of the dips being tested objectively by the texture analyzer. Again, the high fat and low fat dips are not that much different in grams of force. The low fat with Tic caragum dip has higher grams of force, but the goal was to make the dip more like high fat dip. Therefore, the Tic caragum was not necessary to improve the texture of low fat dip because it is more similar to high fat dip without the gum.

In the future, it should be tested to see if adding calcium to low fat dips would have any effect on the texture and palatability. This experiment shows that the fat content of the dip does not determine the overall likeness of the dip. So it should be focused on adding more nutrients to the dip because this could improve the overall health benefits of eating a food like a dip. Calcium has been shown to improve more than just bone health in humans. Increased calcium intake can contribute significantly to improved weight loss and fat loss in addition to calorie restriction (Zemel 2004). Addition of calcium to a low fat French onion dip would be the next step to increasing the nutrition of this product.

Another future experiment could be testing the stability of French onion dip with lower fat content. The removal of fat in dips causes a reduction in stability (Miraglio 1995). Therefore, these low fat dips are good for nutritional purposes, but from a production standpoint can have a shorter shelf life. Low fat French onion dip could be improved by finding a way to make it as stable as a higher fat dip.
References


