

Ouachita Baptist University

Scholarly Commons @ Ouachita

Scholars Day Conference

Scholars Day 2022

Apr 27th, 3:15 PM - 4:30 PM

Use of Milk Alternatives in a Muffin Mix to Determine Acceptance for Lactose Intolerant Individuals

Meg Atchison

Ouachita Baptist University

Follow this and additional works at: https://scholarlycommons.obu.edu/scholars_day_conference



Part of the [Nutrition Commons](#)

Atchison, Meg, "Use of Milk Alternatives in a Muffin Mix to Determine Acceptance for Lactose Intolerant Individuals" (2022). *Scholars Day Conference*. 45.

https://scholarlycommons.obu.edu/scholars_day_conference/2022/posters/45

This Poster is brought to you for free and open access by the Carl Goodson Honors Program at Scholarly Commons @ Ouachita. It has been accepted for inclusion in Scholars Day Conference by an authorized administrator of Scholarly Commons @ Ouachita. For more information, please contact mortensona@obu.edu.



Sensory Evaluation Using Milk Alternatives in a Muffin Mix to Determine Acceptance for Lactose Intolerant Individuals



Meg Atchison

Ouachita Baptist University Nutrition and Dietetics Department

Abstract

Background: Lactose intolerant individuals are faced with the challenge of finding alternatives to dairy containing foods and beverages.

Objective: The objective of the project is to see the effects that non-dairy milk substitutes have on muffins that are made from a mix.

Methods: Twenty judges completed a sensory scorecard evaluation to evaluate various aspects of four different muffins prepared with whole milk as the control, as well as almond milk, water, and soymilk. Microsoft excel was used to chart scorecard data and nutritionist pro was used to conduct a nutrient analysis.

Results: Almond milk had the highest scores for all characteristics evaluated.

Conclusion: Using a milk alternative can still produce a pleasing product for individuals who are lactose intolerant.

Table 1. Muffin Scorecard Sheet

Chocolate Chip Muffin Scorecard				
Characteristic	Sample Number			
	#1215	#1029	#0914	#1103
Crust color 1 = pale 3 = golden brown 5 = burned				
Tenderness 1 = little to no crumbs 3 = moderate crumbs 5 = very crumbly				
Interior color 1 = pale 3 = golden brown 5 = dark brown				
Flavor 1 = unsweet 3 = pleasingly sweet 5 = overly sweet				
Moisture 1 = dry 3 = balanced 5 = very moist				
Texture 1 = mushy 3 = soft but firm 5 = overly chewy				



Figure 3. Ingredients for Sensory Evaluation

Conclusion

Once all the data was collected and analyzed, it was clear to see that the almond milk variation had very pleasing scores. Out of all of the variations the almond milk had the best overall scores for in all of the categories that were scored. This met the criteria for a non-dairy alternative liquid to produce a pleasing product.

Purpose Statement

This research project was conducted to analyze the effects that non-dairy milk substitutes have on muffins that are made from a mix.

Introduction

Many people today are dairy free and cannot tolerate baked goods that consists of milk and other dairy products. Dairy allergies and lactose intolerances are very prevalent and simple changes such as these can allow people who struggle with these issues to enjoy the foods that they love without feeling sick. Lactose intolerance is one of the most common forms of food intolerances and occurs when lactase activity is reduced in the brush border of the small bowel mucosa¹.

Individuals may be lactose intolerant to varying degrees, depending on the severity of the symptoms that follow once lactose is ingested. There is a big difference between a milk allergy and a milk intolerance. A milk allergy is much more severe and is an immune-mediated response from the protein and can be life threatening, while a lactose intolerance is not immune-mediated. Approximately 70% of the global adult population are lactase non-persistent.

It has been seen that consumers have become more interested in preferring vegan milks over normal mammalian milk. Plant-based milks lack certain components that are normally associated with cow's milk such as cholesterol, saturated fatty acids, antigens and lactose. These milk substitutes are also a very good source of minerals, non-allergic proteins, essential fatty acids and much more, which makes it a better suited option to give to dairy free individuals².

Methods

This project consisted of one control and three variables for chocolate chip muffins. The liquid was manipulated in the recipe to make the muffins dairy free. The control was whole milk, and the three other variables were water, soy milk and almond milk (refer to figure 3).

To begin, the oven was preheated to 400 degrees Fahrenheit and the supplies were gathered that would be used for the recipe. A glass bowl, mixing spoon, 24-count mini muffin tin and a liquid measuring cup were all obtained for the supplies needed. There were 4 packages of Martha White Chocolate Chip Muffin Mix used for the experiment.

Each recipe was done one at a time to assure that the exact same methods were being used and the only change included the liquid ingredient being used. First, the glass bowl was obtained, and the package of muffin mix was poured in. After this, ½ cup of the specified liquid for each variable was added in. The mixtures were stirred until fully mixed and with the appearance of a moist batter (figure 1).

The mini muffin tin was sprayed with non-stick baking spray and the mixture was scooped in. Each muffin variable baked for 8-9 minutes and none of the recipes burned or were undercooked. Each variable was cooked evenly through. After the muffins were baked and cooled, they were placed onto a paper plate with the corresponding numbers that were assigned to each variation.

Twenty individuals were randomly selected to taste test each variable that was prepared. Each plate was labeled with four numbers indicating a different variation of the muffin: 1215, 1029, 0914 and 1103 (figure 2). Each participant was given a labeled plate of muffins and a scorecard to fill out (table 1). They were asked to taste each muffin and rate the muffin in six different categories. These six categories included crust color, tenderness, interior color, flavor, moisture, and texture. The scale ranged from 1-5, all categories having a different meaning



Figure 1. Batter being mixed in bowl



Figure 2. Muffin Variations

Results

After each individual evaluated all four muffin variations, they filled out a scorecard and handed it in it. The scorecards were collected, and the data was placed into an excel document to be analyzed. The participants were pleased with the variables and the data that was collected was concise. Each rating varied for each category on which was the most pleasing and the means were recorded (figure 4).

For the crust color, the means were the same for soymilk and almond milk at 2.85. Whole milk mean is 2.45. Water variation mean is 1.95. The water variation produced a very pale crust, while the others produced a golden-brown crust.

For tenderness, all of the means were similar. The almond milk and soymilk variations had the same mean score of 1.35. Water variation had a mean score of 1.20. Whole milk variation had a mean score of 1.00. There were little to no crumbs for all variations, meaning that it was a compact muffin that did not crumble.

For interior color, it showed a similar score pattern to tenderness. The almond milk variation had a mean score of 1.25. The water variation had a mean score of 1.05. The whole milk variation had a mean score of 1.35. The soymilk variation had a mean score of 1.40. The water and whole milk produced a somewhat pale muffin, while the almond milk and soymilk produced a golden-brown muffin, which is desired.

For flavor, the scores were very high and pleasing. The almond milk variation had a mean score of 2.55. The water variation had a mean score of 2.30. The whole milk variation had a mean score of 2.45. The soymilk variation had a mean score of 2.60. The almond milk variation and whole milk scored the highest for flavor with all the other variations following close behind as being pleasingly sweet.

Each muffin variation had a pleasing score for moisture. The almond milk variation had a mean score of 3.30. The water variation had a mean score of 3.40. The whole milk variation had a mean score of 2.65. The soymilk variation had a mean score of 2.50. The water variation consisted of the most moisture which made it slightly unbalanced, then almond milk, whole milk and soymilk.

The texture mean scores for each variation were very pleasing. The almond milk variation had a mean score of 2.85. The water variation had a mean score of 2.55. The whole milk variation had a score of 3.00. The soymilk variation had a mean score of 3.15. The whole milk and soymilk had the most pleasing texture, while the water had the least pleasing.

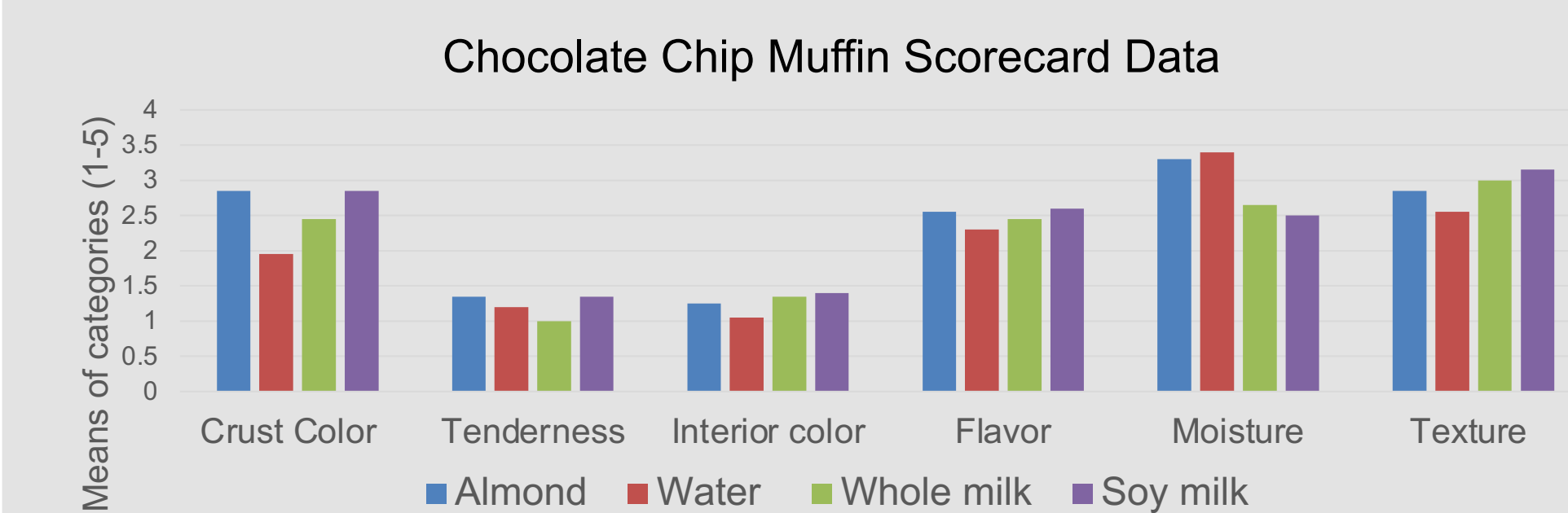


Figure 4. Scorecard Data Means

Table 2. Nutrient Analysis

Variation ½ cup each	Nutrient Analysis			
	#1215 Almond Milk	#1029 Water	#0914 Whole Milk	#1103 Soy milk
Calories (kcal)	202	162	236	217
Protein (g)	3	2	6	6
Carbohydrates (g)	37	30	36	35
Fat (g)	5	4	7	6
Cholesterol (mg)	0	0	12	0
Saturated Fat (g)	0.86	0.86	3	1.1
Sodium (mg)	406	343	396	391
Potassium (mg)	18	0	161	190
Dietary Fiber (g)	.250	0	0	1
Total Sugar (g)	19	13	19	16
Calcium (mg)	225	0	138	225
Iron (mcg)	0.180	0	0.037	.540
Vitamin D (mcg)	1.250	0	1.586	1.50

Nutrient Analysis

The nutrient analysis shows that the milk variations changed the nutrient composition, while the water caused no change. The greatest change in the nutrient analysis was seen in the whole milk variation, which provided the most calories (236 kcals), carbohydrates (36 g), fat (7 g), cholesterol (12 g), saturated fat (3 g), total sugar (19 g), and vitamin D (1.586 mcg). The almond milk variation provided 202 kcals, 37 g of carbohydrates, 5 grams of fat, 0 grams of cholesterol, 0.86 grams of saturated fat, 19 grams of total sugar and 1.250 mg of vitamin D. The water variation provided 162 kcals, 30 g of carbohydrates, 4 grams of fat, 0 grams of cholesterol, 0.86 grams of saturated fat, 13 grams of total sugar and 0 mg of vitamin D. The soymilk variation provided 217 kcals, 35 g of carbohydrates, 6 grams of fat, 0 grams of cholesterol, 1.1 grams of saturated fat, 16 grams of total sugar and 1.50 mg of vitamin D. The protein content of whole milk and soymilk are the same (6 grams), but the almond milk and water variations had much lower amounts of protein (3 grams and 2 grams). (See table 2 for more detailed analysis)

References

- Di Costanzo M, Berni Canani R. Lactose intolerance: Common misunderstandings. *Annals of Nutrition and Metabolism*. 2018;73(Suppl. 4):30-37. doi:10.1159/000493669
- Kundu P, Dhankhar J, Sharma A. Development of non-dairy milk alternative using soymilk and Almond Milk. *Current Research in Nutrition and Food Science Journal*. 2018;6(1):203-210. doi:10.12944/crnfsj.6.1.23