

Sensory Acceptability of Vegan Ingredient Substitutions in Ice Cream

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Background

- Vegans generally have a lower serum cholesterol, body mass index, blood pressure, and risk of heart disease than meat eaters.
- It is important to use fat substitutions, such as dairy and/or egg replacements, with vegan recipes.
- In ice cream, a product mainly composed of: cream, milk solids, sugar and water, vegetable fat substitutions are often utilized in vegan ice cream.
- Fat replacers in vegan ice creams must contain similar structural components to milk fat to preserve texture and mouth feel.



Compassion Nonviolence For the people For the planet For the animals

What is Veganism?

- A philosophy and way of living which seeks to exclude – as far as is possible and practicable – all forms of exploitation of, and cruelty to, animals for food, clothing or any other purpose; and by extension, promotes the development and use of animal-free alternatives for the benefit of humans, animals and the environment.
- In dietary terms, it denotes the practice of dispensing with all products derived wholly or partly from animals. (Vegan Society, 2018).

Objectives

- To determine university students' preferences and sensory ratings of vegan ice cream substitutions.
- To identify which ingredients act as the best fat replacements in vegan ice creams.

Experimental Design

- The single blind, cross-sectional study, approved by TCU IRB, included 54 multidisciplinary student participants enrolled in TCU Nutritional Sciences courses.
- Participants completed a sensory evaluation of three samples of homemade vegan ice cream containing different ingredient substitutions:
 - Sample A: cashew, coconut, coffee, cane sugar
 - Sample B: dates, coconut cream, almond milk
 - Sample C: coconut milk, almond milk, regular sugar
- Participants evaluated each sample based on flavor, sweetness, texture, mouth feel, eye appeal, color, and overall rating of vegan ingredient substitutions for each ice cream recipe.
- Sensory criteria results from students ranking responses were analyzed using SPSS XIX. Frequency distributions, ANOVAs, correlations, and descriptive statistics were determined to meet study objectives ($p \leq 0.05$).

Vegan Recipe Ingredients

Creamiest Vegan Chocolate Ice Cream: Sample A

- 3/4 c. cashews
- 1 1/2 c. water
- 1/4 t. xanthan gum
- 1/2 t. instant espresso
- 2 T. cocoa powder
- 1/4 t. salt
- 1 t. vanilla extract
- 1 c. coconut cream
- 1/2 c. coconut Milk
- 1/2 c. cane sugar
- 6 oz. vegan dark chocolate
- 2 T. cornstarch

Vegan Date Chocolate Ice Cream: Sample B

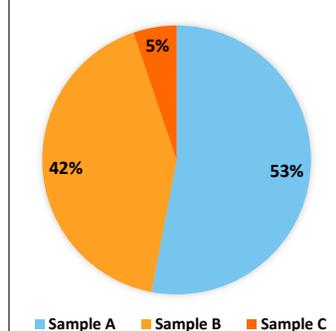
- 2 14 oz. can coconut cream
- 2/3 cup unsweetened cocoa powder
- 8 ounces pitted dates to yield 5 T. date paste
- 1 tsp. pure vanilla extract
- 1 1/4 cup unsweetened almond milk

Vegan Chocolate Ice Cream: Sample C

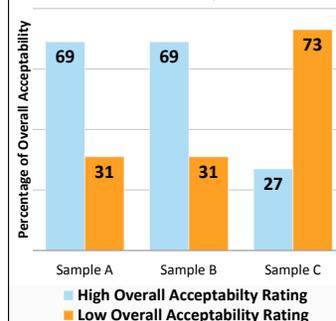
- 1 cup almond milk
- 1 cup canned coconut milk
- 1/4 cup cocoa powder
- 3 T. sugar



Percentage of Participants that Preferred Each Sample



Overall Acceptability Ratings of Ice Cream Samples



Results

- Samples A and B received the highest overall rating by participants (53% and 42%, respectively).
- The flavor of Sample B was preferred by 67% of participants.
- Sample B was also received positively with highest rating in texture, eye appeal, and color: characteristics that make it similar to traditional ice cream.
- Sample C received the lowest overall acceptability rating, with 73% of the participants disliking the flavor and mouth feel.
- A majority of participants (51%) stated that sample A was most similar to traditionally prepared non-vegan ice cream
- 78% of participants stated that they would consume these ice cream samples outside of the study.

Ingredients in Traditional Milk-Based Ice Cream

Commercial milk-based ice cream products are mainly composed of cream, milk solids, sugar, and water.

- 7-15% fat
- 4-5% milk protein
- 5-7% lactose
- 12-16% sugars
- 0.5% stabilizers/emulsifiers/flavor
- 28-40% total solids
- 60-72% water



Differing the ratios of these main components or substituting them will alter the structure of the ice cream.

Conclusions

- Study results support the hypothesis that there are acceptable vegan ice cream ingredient substitutes.
- Cashews, coconut cream, and coffee provide a rich desirable flavor with a creamy texture and mouth feel.
- Cashews and coconut cream were the most suitable fat substitutes for vegan ice cream utilized in this study.
- The vegan ice cream samples created with cashews and coconut cream produce an end product most similar to traditional ice cream.
- Dates provide an appealing texture, eye appeal, and color.
- Coconut cream and almond milk, used in combination with regular granulated sugar, produce an unacceptable grainy mouth feel due to excess crystal formation.
- Vegan and dairy-free ice cream products are an acceptable substitution for traditional ice cream, and food and nutrition professionals should familiarize themselves with these as the demand among consumers grows.

