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**The Use of Dairy-by Products in the Development of Ice-Cream**

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## **Abstract**

Ice cream, an immensely beloved frozen dessert, is a complicated development of dairy and non-dairy ingredients processed under systematic technological conditions to achieve its desired creamy and smooth texture. The food sector is highly prioritizing sustainability and growing diversity in product offerings, leading to the development of new ice cream brands using leftovers as eco-friendly substitutes. The use of dairy by-products, such as whey and buttermilk, in ice cream manufacturing puts in focus their benefits in terms of sustainability, cost effectiveness, and nutritional improvement. Examining the use of dairy by-products in ice cream formulation offers important observations for researchers and industry experts alike, as consumer demand for nutrient-dense and environmentally friendly food items continues to rise.

The study aims to thoroughly evaluate the use of dairy by-products, specifically sweet whey and buttermilk, in the development of ice cream. The two types of ice cream were made, one with sweet whey and the other with buttermilk, using milk, cream, sugar, dextrose, and locust beans. Our goal is to investigate how different by-product substitution concentrations affect important quality measurements of ice creams, such as color, dry matter content, overflow, pH, viscosity, and sensory qualities.

The study primarily focuses on the use of dairy by-products, specifically buttermilk and sweet whey, in the production of ice cream. Sweet whey adds more variation in color and texture, providing different sensory qualities that may appeal to customers looking for a variety of ice cream experiences. With buttermilk favoring a more consistent structure and sweet whey having a richer, creamier body at different percentages of concentrations, both additives showed the ability to improve overrun and sensory aspects. All things considered, using dairy by-products in the manufacturing of ice cream promotes sustainability and provides a practical way to produce a variety of ice cream products with the addition of nutrients. Both of the buttermilk and sweet whey dairy by-products have special benefits in making Ice-Creams, as they have different effects on the product's final texture, sensory appeal, and overrun. The ice cream-making process favors buttermilk due to its creamy and mouthfeel texture, consistent physical features across a range of varying concentrations, and its ability to enhance the consistency and uniformity of the ice cream's texture and color.

According to the results, adding buttermilk improves the ice cream's structural consistency and stability, producing a product with a consistent hue, a steady pH, and a suitable dry matter content. Contrarily, sweet whey adds more color and texture variety and has a richer, creamier body that can appeal to customers looking for a unique sensory experience. Buttermilk proved to be a more dependable option for uniform texture over a variety of concentrations; however, both additives had a favorable impact on overrun and sensory qualities. Though useful in moderation, sweet whey exhibited greater flow resistance at larger concentrations, indicating that a 60% concentration cap is recommended to preserve smoothness and avoid excessive density.

In summary, buttermilk is a better choice for the development of ice cream that is consistently smooth and creamy, especially for the recipes that have a goal for a stable and well-balanced texture. Carefully controlling the different concentrations of sweet whey can be beneficial for specialist ice creams that seek a creamier and denser texture. Both by-products provide nutrient-dense, sustainable alternatives that enhance the creation of ice cream and empower producers to create a diverse range of textures and sensory experiences.