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DEVELOPMENT OF BLUE BERRY (*Vaccinium myrtillus*) MILK-SHAKE AND ITS QUALITY EVALUATION

G. Sabiha Munawar ^{*1}; Prof. A. Swaroopa Rani ¹, P. Hari prasad ²

^{*1} Student, Department of Food Technology, Oil Technological and Pharmaceutical Research institute, JNTU Anantapuramu 515001, Andhra Pradesh, India.

¹ Professor, Head and chairman-board of studies, Department of food technology, Oil technological and pharmaceutical research institute, JNT University, Anantapuramu-515001, Andhra Pradesh, India.

² Plant Manager- Gayathri Milk Dairy pvt. Ltd. Anantapuramu, Andhra Pradesh, India.

mail : g55sabiha@gmail.com

ABSTRACT:

The development of the blueberry milkshake represents a successful integration of nutritional benefits and consumer appeal, offering a product that balances the antioxidant properties of blueberries with the protein and calcium content of milk. The product development process demonstrated that optimizing sensory attributes alongside nutritional integrity can result in a differentiated beverage in a competitive market. Preliminary consumer testing indicates high acceptance levels, while stability and shelf-life assessments suggest promising prospects for commercial scaling. Moving forward, refinement of processing techniques, cost optimization, and targeted marketing strategies will be essential to position the blueberry milkshake as a premium, health-oriented option within the functional beverage segment.

The research also considers the impact of different blueberry forms (fresh, frozen, or by-products) and sweeteners on the milkshake's quality and health benefits. Results indicate that blueberry addition enhances the milkshake's antioxidant capacity and sensory appeal without adversely affecting its texture or flow behavior, supporting the potential of blueberry milkshakes as a nutritious and enjoyable functional drink. This work contributes to the development of innovative dairy-based products enriched with natural bioactive compounds from blueberries.

KEY WORDS:

Frozen blueberries, antioxidants, functional drink, Cost optimization.

INTRODUCTION:

Milk, a natural source of essential nutrients such as calcium, protein, vitamins, and minerals, has played a pivotal role in supporting growth, bone health, and overall wellbeing. Dairy products also offer versatility, serving as key ingredients in culinary creations and dietary regimens. From childhood development to maintaining health in adulthood, dairy's nutritional contributions are undeniable. Beyond its nutritional value, the dairy industry is a driving force in economic development. Dairy farming provides livelihoods for millions, from small-scale family operations to large commercial enterprises.

Technological advancements in food processing have significantly influenced the milkshake industry. The development of emulsifiers, stabilizers, and homogenization techniques has improved texture, mouthfeel, and shelf stability. In parallel, high-pressure processing (HPP), ultra-high-temperature (UHT) treatment, and aseptic packaging have enabled the production of long-lasting milkshake products without compromising sensory quality. Innovations such as high-speed blenders, commercial dispensing equipment, and cold chain logistics have streamlined production and distribution, further supporting market growth.

This study focuses on the development, optimization, and evaluation of blueberry milkshakes, assessing their physicochemical characteristics, nutritional composition, antioxidant potential, and consumer acceptability. It explores the compositional, sensory, and nutritional properties of blueberry milkshakes, emphasizing their potential as a functional and flavorful beverage. Blueberries are rich in antioxidants, vitamins, and minerals, making them an ideal ingredient for health-focused dietary products. The research investigates the influence of ingredient

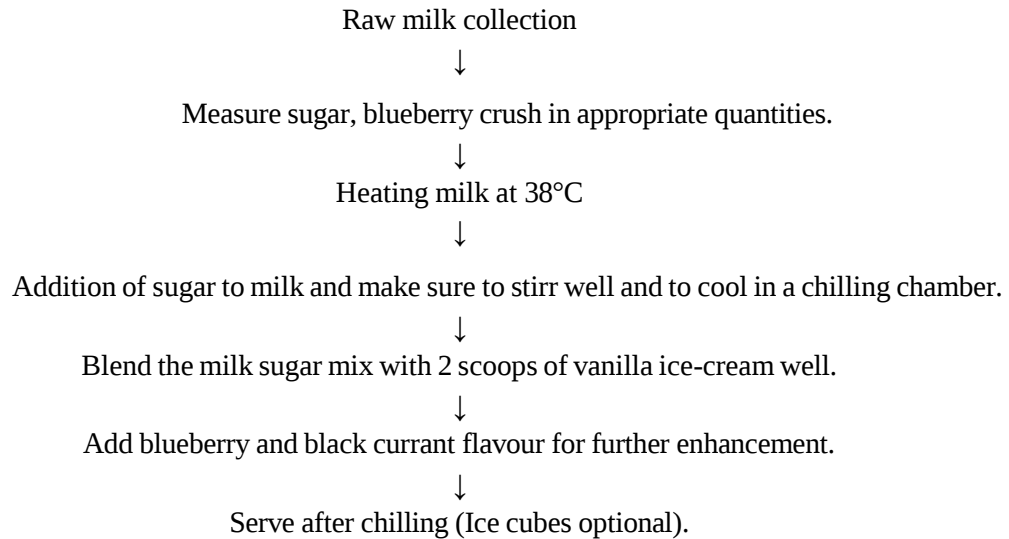
ratios, blending techniques, and storage conditions on the physicochemical characteristics of the milkshake, including viscosity, color stability, and antioxidant retention. Sensory evaluations were conducted to assess consumer preferences for sweetness, texture, and overall palatability.

MATERIALS AND METHODS:

Pasteurized milk, crystal sugar, blueberry crush, blueberry flavour, blackcurrent flavour, vanilla icecream.

Preparation of Blueberry Milkshake:

- * Prepare Ingredients Measure and gather all ingredients. Chill the milk beforehand for a better texture.
- * Blend the Ingredients In a blender, add blueberries, milk, sweetener, and ice cream (if using). Blend on high speed for about 30–60 seconds until smooth and creamy. Add flavour appropriately.
- * Strain (optional) For a smoother texture, strain the mixture using a fine sieve to remove blueberry skins (optional, based on preference).
- * Serve Immediately Pour the milkshake into a chilled glass. Garnish with a few blueberries or a mint leaf if desired. Serve cold.

PREPARATION FLOW CHART OF BLUEBERRY MILKSHAKE :

INGREDIENTS	SAMPLE 1	SAMPLE 2
Full cream milk	500 ml	750 ml
Sugar	80 gm	90 gm
Blueberry crush	50 gm	60 gm
Vanilla Icecream	2 Scoops	3 Scoops
Blueberry, Blackcurrent Flavour	2 drops, 1 drop	3 drops , 2 drops

RESULTS AND DISCUSSION:

SENSORY EVALUATION AND ANALYSIS:

A sensory evaluation of a Blueberry Milkshake using human senses to assess its quality, flavor, and overall acceptability. This evaluation typically covers below key sensory attributes:

Color: Should be uniform and typical of Blueberry. Any variation or separation may suggest poor mixing or ingredient issues.

Opacity: A desirable Milkshake should be opaque, indicating richness.

Surface: Ideally smooth, without bubbles or foam unless whipped for effect.

Presentation: The overall look should be clean, well-blended, and inviting.

Aroma (Smell): Primary Aroma: Strong Blueberry scent is ideal. Secondary

Notes: Can include vanilla, cream, nuts depending on ingredient.

SENSORY ATTRIBUTES	SAMPLE 1	SAMPLE 2
Color	9	8
Appearance	9	8
Flavor	9	9
Texture	8	8
Taste	8.5	8
Overall acceptance	9	8

MOISTURE CONTENT:

Moisture content affects the milkshake's texture, flavor, and shelf life. Higher moisture results in a lighter, icier texture, while lower moisture gives a creamier mouthfeel. Premium shakes typically have lower moisture due to less air (overrun). The experimental product's moisture content was similar to the control, indicating the stabilizer replacement had no significant effect.

FAT:

Fat enhances the milkshake's creaminess, flavor, and smooth texture. It also reduces iciness and acts as a flavor carrier. The experimental shake showed a slight decrease in fat content compared to the control but remained within acceptable standards. Low-fat shakes rely on stabilizers to mimic rich textures.

PROTEIN:

Protein in milkshakes comes from milk and cream, contributing to nutrition and satiety. Higher protein content can enhance fullness and reflect the use of quality dairy or protein additives. It's important for dietary needs, muscle maintenance, and health-conscious consumers.

NUTRITION	CONTROL	SAMPLE
MOISTURE	53.84%	53.27%
FAT	8.77%	9.2%
PROTEIN	2.25%	4.32%
ACIDITY	0.32%	0.29%

CONCLUSION:

The present study focused on the development, formulation, and quality evaluation of blueberry milkshake, combining the nutritional benefits of blueberries with the rich composition of milk. The research successfully demonstrated that blueberry milkshake is not only appealing in terms of flavor and color but also offers considerable health benefits due to its high antioxidant content, primarily from anthocyanins. Sensory evaluations revealed a high degree of consumer acceptability for milkshakes with balanced sweetness, a natural fruit flavor, and a smooth texture. Physicochemical analysis showed stability in pH, viscosity, and total soluble solids. Microbiological testing confirmed that, when

properly formulated with natural preservatives, the product remained safe and acceptable for up to 7–10 days under refrigerated conditions.

The integration of blueberries into milkshakes demonstrates strong potential for developing value-added dairy beverages that cater to the growing demand for functional foods. This research supports the viability of blueberry milkshake as a market-ready product that aligns with modern health and wellness trends.

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