

Valorization of Acidic Whey in Strawberry-Based Functional Beverages

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INTRODUCTION & AIM

Background: Acidic whey is a nutrient-rich by-product of cheese production containing valuable proteins, lactose, vitamins, and minerals. However, improper disposal of acidic whey contributes to environmental pollution.

Rationale: Incorporating acidic whey into fruit-based functional beverages offers a sustainable solution to valorize dairy waste while improving the nutritional profile of the final product.

Objective: This study aimed to develop and evaluate a strawberry–acidic whey beverage preserved by ultrasonication as a non-thermal alternative to conventional heat treatment.

METHOD

Formulation: The beverage was prepared with 70% strawberry juice and 30% acidic whey.

Treatments: T₀: Control (untreated), T₁: Thermal (80 °C, 10 min), T₂: Ultrasonication (25 kHz, 5 min), T₃: Ultrasonication (25 kHz, 10 min)

Storage & Analysis: All samples were stored at refrigeration temperature (4 ± 1 °C) for 28 days and analyzed for: **Physicochemical parameters:** pH, sedimentation **Phytochemical indices:** Total phenolic content (TPC), total flavonoid content (TFC), DPPH antioxidant activity and **Microbial quality:** Total plate count (TPC).

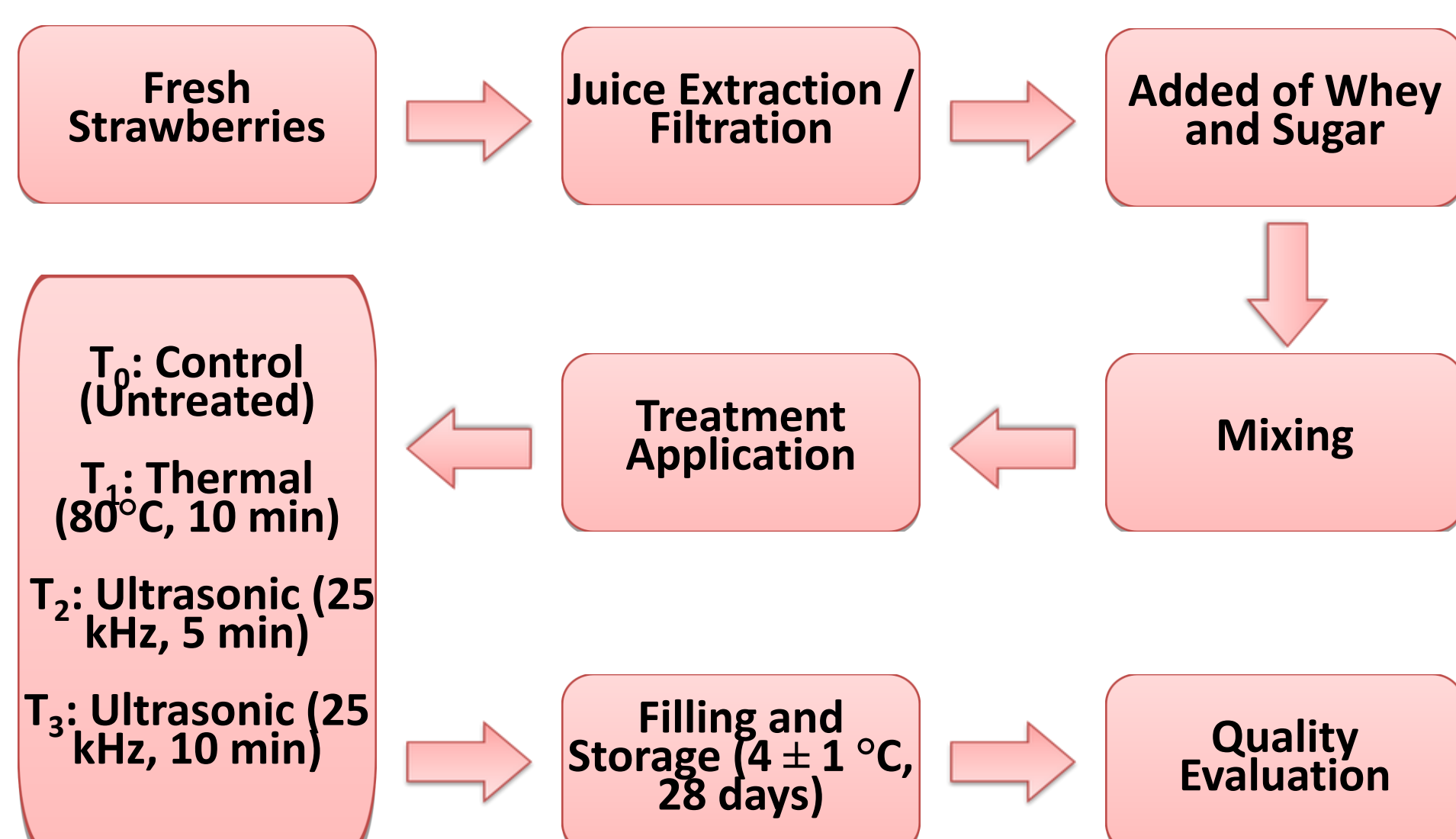


Fig. 1. Flow chart for the experimental layout

RESULTS & DISCUSSION

T₃ (ultrasonication for 10 min) showed the most favorable results, with the least pH decline and **42.9% lower sedimentation** than the control (T₀). It retained the **highest phenolic (725.08 µg GAE/g)** and **flavonoid (384.85 µg CE/g)** contents, along with a **45.7% higher antioxidant activity** and **74.1% lower microbial load**. Overall, T₃ proved to be the most effective treatment for preserving the **physicochemical, phytochemical, and microbial quality** of the strawberry–acidic whey beverage.

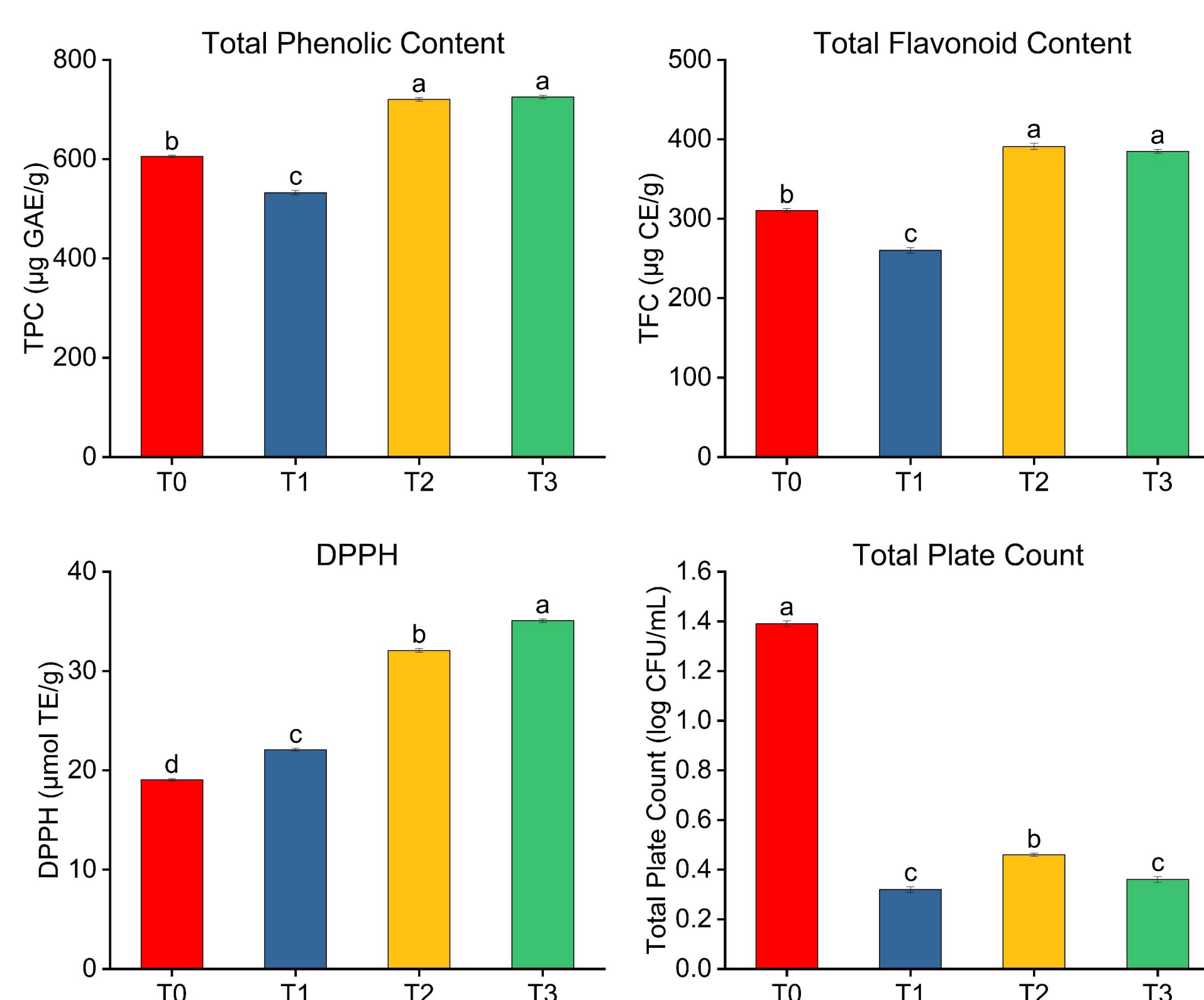


Fig. 2. Total phenolic contents, flavonoids, DPPH, and total plate count of whey-based strawberry juice after 28-days of storage. ($p \leq 0.05$)

CONCLUSION

Ultrasonication (T₃, 10 min) effectively preserved the **nutritional, antioxidant, and microbial quality** of strawberry–acidic whey beverages, offering a **sustainable non-thermal method** for **dairy by-product valorization** into functional drinks.

FUTURE WORK

Further research will focus on **sensory evaluation**, **consumer acceptability**, and **scale-up potential** of ultrasonicated whey–fruit beverages.