

Development of a Fermented Whey Dairy Beverage Fortified with Bovine Collagen as a Functional Food Commodity

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Value addition to whey can be considered one of the maximize resource utilizations from industrial by-products. The main purposes of this study were to develop a fermented whey-based collagen incorporated dairy beverage and evaluate physicochemical, compositional, and microbial properties to determine the shelf life of the final product. In the current study, the preparation of five treatment combinations with different concentrations of whey (0%, 80%, 70%, 60%, and 50% w/w) and collagen (0%, 1.25%, 1.5%, 1.75%, and 2% w/w) were carried out. The best ratio of whey and collagen preparation was selected by conducting a nine-point hedonic scale sensory evaluation for sensory attributes (colour, aroma, flavour, texture, and overall acceptability). The final selected whey and collagen treatment combination was further evaluated for physicochemical properties (pH, colour, titratable acidity, total soluble solid content, and viscosity) and microbiological properties. The product was subjected to different physicochemical analyses at 0 days, 3 days, 7 days, 11 days and 14 days of storage at $5\pm 1^{\circ}\text{C}$. Data from sensory evaluation was analyzed using the Friedman nonparametric test, and the data of the compositional analysis, physicochemical analysis, and microbial properties analysis of the final product were analyzed using one-way ANOVA in the MINITAB software package with a 95% confidence interval. The compositional analyses revealed that 70% whey and 1.5% collagen incorporated beverage had $18.67\pm 0.21\%$ dry matter, $0.01\pm 0.00\%$ crude fat, $2.59\pm 0.08\%$ crude protein, and $15.42\pm 0.32\%$ nitrogen free extract. Dairy beverage also had 301.96 ± 6.74 KJ per 100g of gross energy. The total lactic acid bacterial counts (7.06 ± 0.39 log CFU/mL) were not less than the minimum acceptable limits (7 log CFU/mL) up to the date of expiry stated by the SLSI at 9 days storage at $5\pm 1^{\circ}\text{C}$. Yeast and mold counts were reached to an unacceptable level after the 11th day of storage (>2 log CFU/mL). The viscosity and titratable acidity were the highest and pH and colour were the lowest at the 14th day of storage period ($P<0.05$). Total soluble content of the final product on the 7th day of storage period was lower than the initial °Brix value of the product on day 1. Therefore, shelf life of the final dairy beverage was estimated as 9-11 days under $5\pm 1^{\circ}\text{C}$ without added preservatives. The results of this study revealed that 70% (w/w) whey and 1.5% (w/w) collagen incorporated fermented value-added dairy beverage can serve as an innovative and newly emerged functional drink.

Keywords: Whey, Collagen, Physicochemical properties, Proximate composition, Sensory evaluation

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