

Title Whey permeate as a bio-preservative for shelf life maintenance of fresh-cut vegetables
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Abstract

Whey permeate at different concentrations (0.5%, 1.5% and 3%) was used as natural sanitizing agent in the washing treatment of fresh-cut lettuce and carrots. These treatments were compared with a chlorine 120 ppm widely used in the industry. Microbiological, quality (colour changes, browning-related enzymes, headspace gas composition, textural changes and sensory analysis) and nutritional (ascorbic acid and carotenoids) markers were monitored over 10 days in fresh-cut lettuce and carrot packages stored at 4 °C. Whey permeate at 3% resulted in equivalent or better microbial load reduction than chlorine. Although lower concentration of whey permeate produced minor initial reduction, microbial counts at the end of the storage were below the recommended levels (10^8 CFU/g) for safety of fresh-cut vegetables. Sensory analysis panel considered all the samples of fresh-cut lettuce acceptable. However, in the sensory results the sliced carrots treated with 3% whey permeate and chlorine scored lower acceptability due to higher surface whiteness, although these samples had lower microbial loads. Three percent WP controlled the browning-related enzymes better than 0.5%, 1.5% WP and chlorine and consequently the browning. However, this reduction in browning-related enzymes did not result in a lower browning appearance to visual observation during the 10 storage days. The use of high concentrations of WP accelerated the loss of ascorbic acid and carotenoids. These results suggest that whey permeate could be a promising alternative to chlorine for sanitizing fresh-cut vegetables.

Industrial relevance

Many attempts have been made to increase the use of whey, a valuable by-product of cheese processing, and many attempts have been made to increase shelf life of fresh-cut fruits and vegetables. This paper takes an interesting approach by attempting to use whey permeate as antimicrobial agent. Whey permeate solution proved successful in controlling total counts via a washing step of fresh cut vegetables. Although this does not reduce the amount of whey released, it could provide use as antimicrobial prior to discarding.