Ozone as a promising strategy for controlling blue discoloration caused by Pseudomonas spp. in Fresh Cheese

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Blue spots in fresh cheese caused by pigment-producing Pseudomonas spp. are a significant issue in the dairy industry worldwide. Besides causing cheese spoilage, the presence of these spots can result in food waste, economic losses, and negative social and environmental impacts. Consequently, there arises the need to implement strategies in the dairy sector, not only to mitigate the problem of blue spots in fresh cheeses, but also to demonstrate a solid commitment to sustainability and meet the increasingly higher expectations of consumers for safer and healthier food products. Thus, the objective of this study was to assess the ozonation for controlling the blue discoloration caused by Pseudomonas spp. in fresh cheese. Pseudomonas paracarnis A006, a blue pigment producer strain, was used as the target microorganism in this study. A cheese-mimicking model was used as a matrix simulating fresh cheese. Each cheese-mimicking model was inoculated with P. paracarnis A006 at 104 CFU/g. The samples were treated with ozone inlet concentration of 0.50 and 5.0 mg/L with a flow rate of 2.0 L/min. Cheese-mimicking models were arranged in an acrylic chamber, with exposure time of 0 (control), 30, 60, and 90 minutes. After ozonation, the models were stored at 5 °C for 7 days. Following the storage, samples were assessed by surface color analysis conducted using a colorimeter. Additionally, photos of the cheeses were taken to visually record the results. The L* (luminosity), a* (green-red value), and b* (blue-yellow value) coordinates were obtained, and the Hue (H) and Chroma (C) color coordinates were calculated. Two measurements were obtained at different random points of each evaluated sample. Furthermore, color variation (ΔE) was calculated based on the L*, a*, and b* values to quantify the color difference between samples. It was observed that cheese-mimicking models treated with the highest ozone concentration (5.0 mg/L) and longest exposure time (90 minutes) maintained color closest to the non-ozone-treated control. The non inoculated sample achieved H and C values of 110.76 and C = 7.48, respectively, closely resembling the values of samples ozonized at 5.0 mg/L for 90 minutes (H = 109.08 and C = 7.90). Additionally, the ΔE between these two samples was 2.49, indicating color consistency that is imperceptible to the human eye. These findings indicate that gaseous ozone exerted a significant effect on controlling the blue discoloration in fresh cheese, offering a viable approach for improving the quality and extending the shelf life of these dairy products.

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