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Effects of Manufacturing Process Conditions on Sensory Attributes and Microstructure of Ice Cream

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The primary process parameters of the homogenization pressure and freezing process (drawing temperature and overrun) for ice cream manufacture were examined to determine their impact on the sensory attributes and odor sensor response of ice cream. Fifteen process conditions were selected using a Box-Behnken design, while 12 sensory attributes were obtained as assessment items based on sensory evaluations using quantitative descriptive analysis (QDA). Eleven of these sensory attributes changed significantly according to process conditions, suggesting that such conditions can have a major impact on ice cream's sensory attributes, even for a fixed make-up of ingredients. Furthermore, observed correlations between the sensory attributes and microstructural attributes of the ice cream led to the conjecture that the sensory attributes were influenced by changes to the ice cream's structural conditions resulting from the process conditions. A correlation was also observed between the odor sensor response and the overrun condition, but no clear correlations were found to exist within the ice cream structure or the sensory attributes.

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