Educational Experimental Errors

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Research Papers

Khantyanissa, H. S., & Ervina, E. (2024). Consumer preferences of artificial and natural flavours: A case in soft ice cream. IOP Conference Series: Earth and Environmental Science, 1352(1), 012088.

Overview

A recent study compared soft ice cream samples made with natural and artificial vanilla flavours. Despite consumers increasingly favouring “natural” labels, the findings showed little sensory difference between the samples and consumers actually preferred the ice cream made with artificial vanilla. Neither gender nor age influenced preferences.

However, a subtle experimental error may have affected results: the natural vanilla sample was icier, potentially influencing consumer liking. Although labels were not used during tasting, in real-world scenarios, labels like "natural" or "artificial" could still strongly shape consumer expectations and choices.

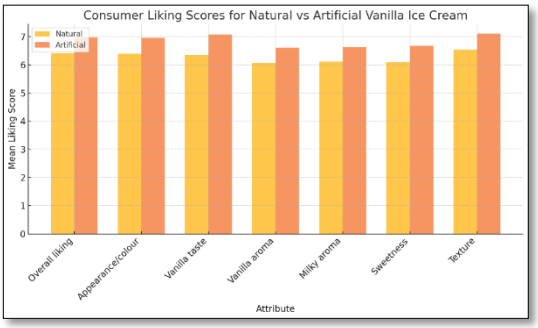
This case highlights the importance of careful experimental design and understanding how consumer preferences can be driven by subtle cues beyond flavour alone.

Key Findings & Insights

Sensory Profile: descriptive analysis showed no major differences between natural and artificial vanilla ice cream samples for aroma or flavour. The only significant sensory difference was texture, the natural vanilla sample was perceived as more icy ($p = 0.003$).

Differentiation Test: in triangle tests, 40 semi-trained panellists could not reliably tell apart natural and artificial vanilla ice cream ($p = 0.09$), suggesting that sensory differences were not noticeable in this experience format.

Consumer Liking: in blind tasting among 162 consumers in a store setting, the ice cream made with artificial vanilla flavour scored significantly higher on all hedonic attributes: overall liking, appearance, vanilla taste and aroma, milky aroma, sweetness, and texture ($p < 0.01$).



Gender and Age: neither gender nor age group influenced consumer preferences. Men and women, as well as younger (14–25 years) and older (26–55 years) participants, rated the artificial vanilla sample higher across all measures.

Label Effects (Important Note): the study used blind tasting without any product labels. In real-world buying, labels such as "natural" or "artificial" could change consumer expectations and experiences, even when the actual sensory differences are minimal.

Experimental Error Highlighted: the icier texture of the natural vanilla sample, likely due to batch variation rather than flavour type, may have unintentionally influenced liking scores. This underlines the importance of controlling all product attributes when comparing flavours.

Conclusion

Account for batch-to-batch variation to avoid confounding factors like texture differences.
Triangle tests can fail to detect subtle product differences, consider using additional methods.
Include branded and labelled samples in future studies to measure how expectations influence choice.