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Characterization of aroma compounds in commercialized chicken meat (*Arbor acres*) using gas chromatography–olfactometry–mass spectrometry (GC-O-MS)

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INTRODUCTION & AIM

This research investigates the volatile organic compounds (VOCs) that affect the flavor and quality of *Arbor acres* chicken, focusing on the pectoralis muscle and hip cuts. Using gas chromatography–olfactometry–mass spectrometry (GC-O-MS) for qualitative analysis, this study compared the volatile profiles of cooked and raw chicken samples. Preparation techniques included static headspace (SHS) and headspace solid-phase microextraction (HS-SPME), with HS-SPME proving particularly effective in isolating key compounds that influence meat flavor.

The results showed that cooked chicken had higher concentrations of potentially harmful substances compared to raw samples, indicating that cooking alters meat composition. HS-SPME identified over ten VOCs associated with flavor quality and spoilage, including aldehydes like hexanal, heptanal, octanal, nonanal, and decanal. These aldehydes, known for their rancid or grassy odors, were identified through mass spectral matching, retention index (*RI*) values (770-890), and real-time sniffing evaluations by trained analysts.

The increased aldehyde levels in cooked chicken highlight how cooking processes can elevate both beneficial and undesirable VOCs, affecting flavor and freshness. While aldehydes are typically linked to lipid oxidation, their higher concentration in cooked samples suggests a need for optimized cooking and storage methods to preserve desired flavors and minimize off-flavors.

This study provides valuable insights into the VOC profiles of chicken meat and demonstrates the effectiveness of SHS and HS-SPME techniques in food quality analysis.

METHOD

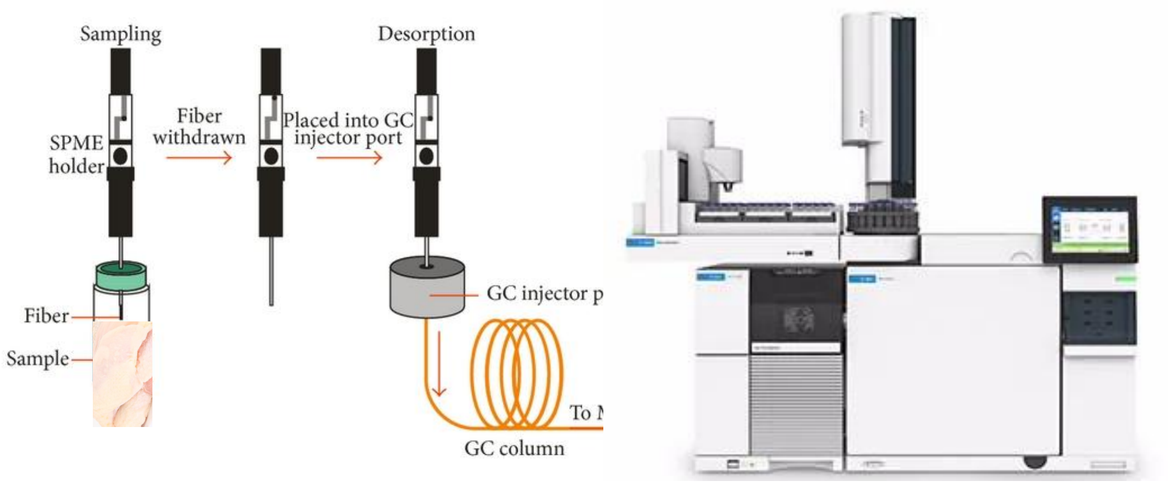

Figure 1. Sample preparation of cooked chicken meat samples and qualitative analysis of the VOC profile of *Arbor Acres* using the HS-SPME-GC-O-MS technique.

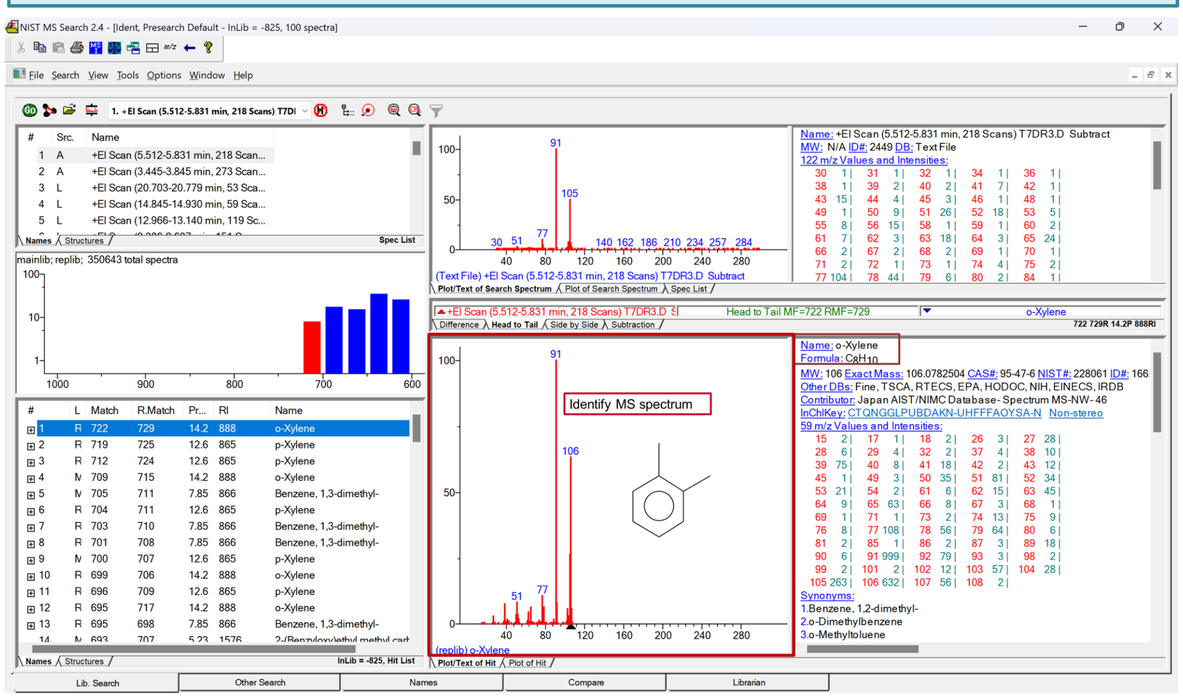

Figure 2. Qualitative data analysis was performed using the NIST 22 library search.

RESULTS & DISCUSSION

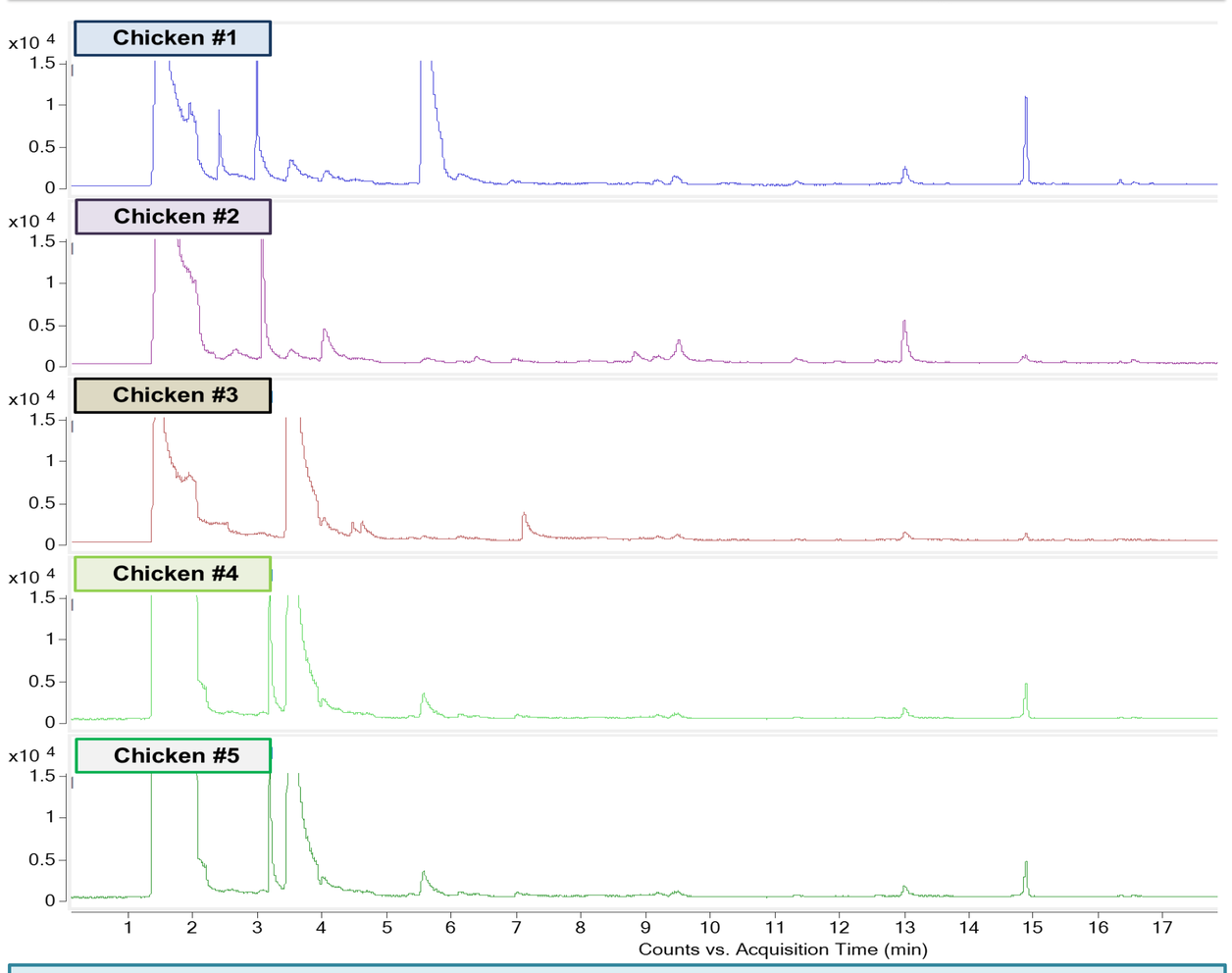

Figure 3. Total ion chromatograms (TIC) from GC-O-MS results for chicken samples from different commercial brands, labeled as chicken #1-5. Sample preparation was carried out using HS-SPME with an extraction temperature of 60 ºC.

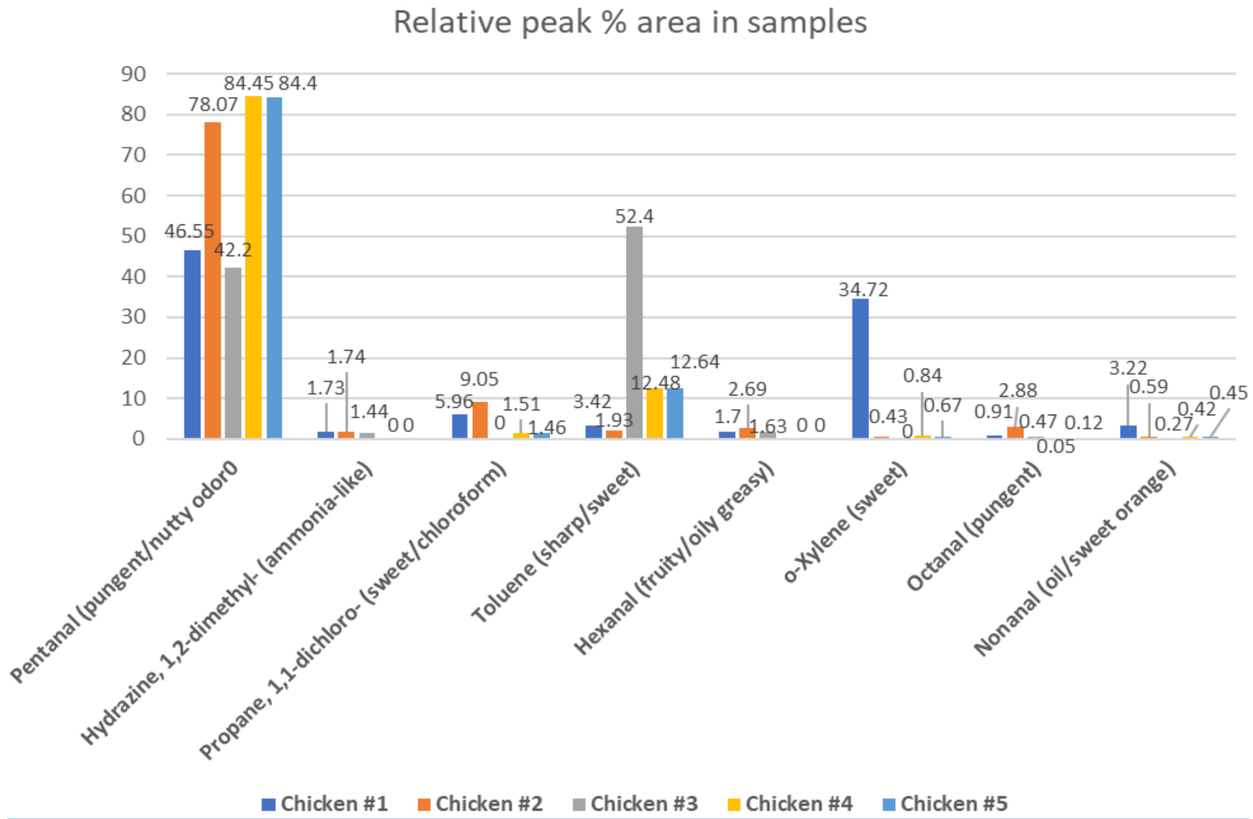

Table 1. Qualitative analysis comparing the main odor-active VOCs, their relative peak % area in the samples, and odor descriptions of five cooked chicken meat samples.

CONCLUSION

The findings contribute to advancing flavor analysis and improving the sensory quality of poultry products. These insights have broad implications for future research on VOCs in meat, the development of processing standards, and quality control strategies aimed at enhancing consumer satisfaction with poultry products.

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