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The assessment of the dual impact of heating treatments on food safety and aroma is a key issue. The objective of the present paper was the determination of process-induced polycyclic aromatic hydrocarbons (PAHs) and odor-active compounds with cooked meat as food model. PAHs were analysed by accelerated solvent extraction - comprehensive bidimensional gas chromatography - time-of-flight mass spectrometry (ASE-GCxGC-TOFMS). Odor-active compounds were determined by dynamic headspace-GC-eightbooth olfactometry (DH-GC-8O) and DH-multidimensional GC hyphenated with olfactometry and mass spectrometry (DH-GC-GC-O/MS). For PAH determination, the GC´GC conditions consisted in a combination of a primary apolar BPX5 column and a secondary polar BPX50 column, and a modulation period of 5 s. In terms of linearity, recovery rate and limit of quantification, the ASE-GCxGC-TOFMS method was found consistent with the multi-residue determination of 17 PAHs in cooked meat. For aroma compounds, multi-booth olfactometry using eight sniffers revealed major meat odor-active compounds. A home-made heart-cut GC-GC-MS/O enabled to resolve the co-eluting odor zones with high odor-activity. Finally, these developments of multidimensional approaches were used to investigate and compare the balance between 17 PAHs and 68 odor-active compounds generated with different cooking techniques.