Changes in volatile compounds in a fresh lamb sausage refrigerated stored under anaerobic modified atmosphere

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Abstract:

Fresh sausages are commonly packaged in anaerobic modified atmospheres and stored under refrigeration in order to achieve a long shelf life, i.e. few weeks. During storage and due to the internal conditions of fresh sausages (pH, aw, nutrient availability) there is a progressive development of facultative anaerobic bacteria, i.e. lactic acid bacteria or enterobacteria, which in the course of time results in product spoilage. The main reason for this is the production volatile compounds from microbial metabolism which can lead on the generation of undesirable flavours. In this study, the volatile compounds in a fresh Bosnian-style lamb sausage during refrigerated storage under 20% CO2 and 80% N2 atmosphere were weekly monitored for 35 days. Sausages were prepared in triplicate and volatiles were determined by head space solid-phase microextraction (SPME) coupled with gas chromatography-mass spectrometry. The microbial origin volatiles detected at day 0 (stuffing into casings) were diacetyl, hexanol and ethylhexanol. At day 7 of storage appeared 3-methyl-butanal, 3-methyl-butanol and acetoin, at day 14 ethyl acetate, ethylhexanoate and benzene acetaldehyde, and at day 28 butanediol. Most of them tended to increase during storage until a point where their concentrations stabilise. Relevant increases were observed for diacetyl from day 0 to 7, 1-hexanol from day 14 to 21 (then tended to decrease) and acetoin from day 21 to 28. Moreover, ethyl acetate, acetoin, 3-methyl-butanol, ethylhexanoate and ethylhexanol increased from the day where they were detected to day 28. Meanwhile, butanediol and benzene acetaldehyde increased until the end of storage. Volatiles presumably originated from lipid oxidation, such as hexanal, 1-octen-3-ol or heptanal, were also detected and their concentration tended to be constant or decrease with time. Changes in volatiles due to microbial metabolism were already observed at day 7 of storage; however, the major changes were observed from days 14 to 28.