Influence of smoking parameters on the concentration of polycyclic aromatic hydrocarbons (PAHs) in Danish smoked fish - DTU Orbit (14/12/2018)

Influence of smoking parameters on the concentration of polycyclic aromatic hydrocarbons (PAHs) in Danish smoked fish

A new method for the analysis of 25 polycyclic aromatic hydrocarbon (PAH) compounds in fish was developed, validated, and used for the quantification of PAHs in 180 industrially smoked fish products. The method included pressurized liquid extraction, gel-permeation chromatography (Bio-beads S-X3), solid-phase extraction (silica gel), and gas chromatography-mass spectrometry analysis. The sum concentration of 25 PAHs (Sigma PAH25) was highest in smoked herring (n = 3) and mackerel fillets (n = 13), with an average concentration of 320 and 235 μg kg⁻¹, respectively. Lowest average Sigma PAH25 concentrations were obtained for indirectly smoked trout (26 μg kg⁻¹). Principal component analysis was used to correlate processing parameters to PAH concentrations and to identify the effects of these parameters. The analysis showed that for salmon hot-smoking conditions lead to higher sigma PAH25 than cold smoking, and for other fish species direct smoking leads to higher sigma PAH25 than indirect smoking. Also, the usage of common alder increases the PAH contamination compared with beech. The effects of smoking time, combustion temperatures, and two types of smoke-generating material on the Sigma PAH25 were also tested in a pilot plant study with smoked trout as a model fish. In addition to confirming that increased combustion temperatures and usage of common alder in comparison with beech increased Sigma PAH25, it was also revealed that the PAH concentration decreased in the order fish skin >> outer layer of the fish muscle inner part of the fish muscle.