This thesis aimed to develop and use bioassays for risk assessment of polycyclic aromatic hydrocarbons (PAHs) and perfluoroalkyl and polyfluoroalkyl substances (PFASs). PAHs are widespread contaminants formed during incomplete combustion of organic material and are potentially carcinogenic to humans. PFASs are found all over the world in various human and wildlife samples due to high persistence and bioaccumulation. One assay that was developed was directed towards detecting chemical effects on hepatic lipid oxidation in chicken embryos in ovo. The results for this bioassay show that following exposure to a 16 PAHs mixture, the hepatic fatty acid β-oxidation was reduced, however, perfluorooctane sulfonate (PFOS) and an oxygenated PAH metabolite were found to induce the hepatic fatty acid β-oxidation compared to control. The implication of these findings on risk assessment of PFASs, PAHs and PAH metabolite exposure remains to be determined.