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Fate of polychlorobiphenyls in the insect *Tenebrio molitor*: consequences for further use as food and feed

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Background/Objectives: Given the world population increase, there is a growing need to find alternative and sustainable protein sources for food and feed. Edible insects are an interesting solution with low greenhouse gas emissions, high feed conversion efficiency, low land use, and their ability to transform low value organic co-products into high value protein products⁽¹⁾. In counterpart, one of the potential risks associated with their consumption is the chemical contamination. In urban areas, this chemical risk may be linked to emission sources of persistent organic pollutants (POPs)⁽²⁾ such as polychlorobiphenyls (PCBs), dioxins (PCDD/Fs), polycyclic aromatic hydrocarbons (PAHs)...inducing their ubiquitous presence at trace levels in food supply⁽³⁾. In this context, this study explored the ability of yellow mealworm (*Tenebrio molitor*), the most widely bred and traded insect species in Europe⁽⁴⁾, to bioaccumulate PCBs from their feeding substrate.

Methods: *Tenebrio molitor* larvae were reared during 20 days in a temperature and humidity-controlled incubator and fed with wheat bran artificially contaminated with PCBs at a concentration of 0.67 ppb, 4 ppb or 24.4 ppb (n = 3 for each concentration). The larvae PCB content was then measured based on an extraction method inspired by Planche et al.⁽⁵⁾ and an analysis by gaz chromatography coupled with a micro-Electron Capture Detector (μ ECD).

Results: Whatever the PCB contamination level, no significant impact was observed on the larval growth. The bioaccumulation factors (BAF (%)) = $100 \times$ concentration of PCBs in larvae / concentration of PCBs in wheat bran obtained with fresh larvae are between 77% and 82%. With dried larvae, the most common commercially available form, the bioaccumulation factors ranged between 216% and 233%.

Discussion / Conclusion: This study highlights the ability of *Tenebrio molitor* to accumulate PCBs from their diet during rearing and the significant impact of the drying process on the bioaccumulation factors. This demonstrates the importance of considering the quality of the substrates used for farming insects as food and feed in terms of content in chemical contaminants including POPs like PCBs.

References

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Disclosure of Interest

None Declared