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

Christelle Planche, Frédéric Mercier, Johanna Rivas, Magaly Angénieux, Hanli Wang, Benjamin Calmont, Sébastien Crépieux, jérémy ratel, Erwan Engel

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C. Planche¹, F. Mercier¹, J. Rivas¹, M. Angénieux¹, H. Wang¹, B. Calmont², S. Crépeux³, J. Ratel¹, E. Engel¹

¹MASS group, UR QuaPA, INRAE, F-63122 Saint-Genès-Champanelle, France

²SHNAO, Société d'histoire naturelle Alcide-d'Orbigny, F-63170 Aubière, France

³Invers, F-63720 Saint-Ignat, France



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

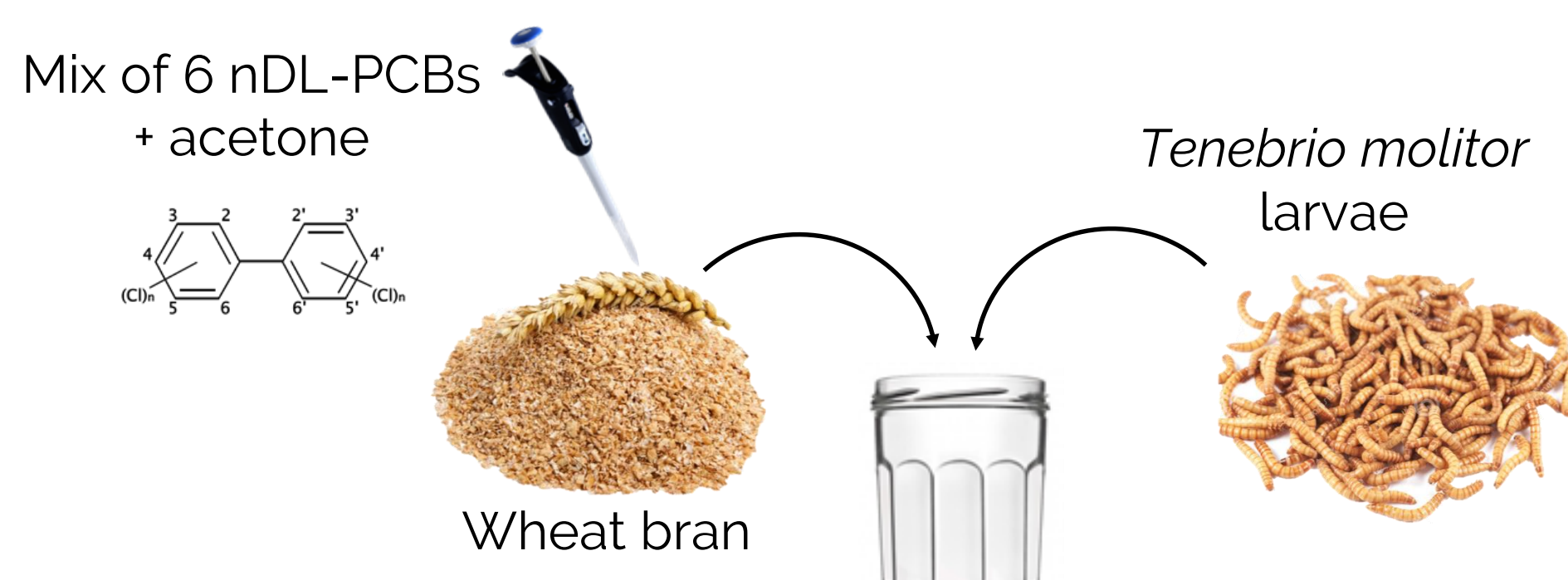


Background

There is a growing demand for animal protein while the resources used for animal feeding are limited or may raise environmental issues. Thus, there is a need to find alternative and sustainable protein sources. Edible insects may be an interesting solution with a good nutritional value [1]. Learning from the BSE prion crisis, it is essential to ensure the safety of insect products and the chemical contamination is a crucial issue [2]. Among priority contaminants, persistent organic pollutants (POPs) such as polychlorobiphenyls (PCBs), dioxins (PCDD/Fs) or polycyclic aromatic hydrocarbon (PAHs) are of serious concern 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, to bioaccumulate PCBs from their feeding substrate.

Methods

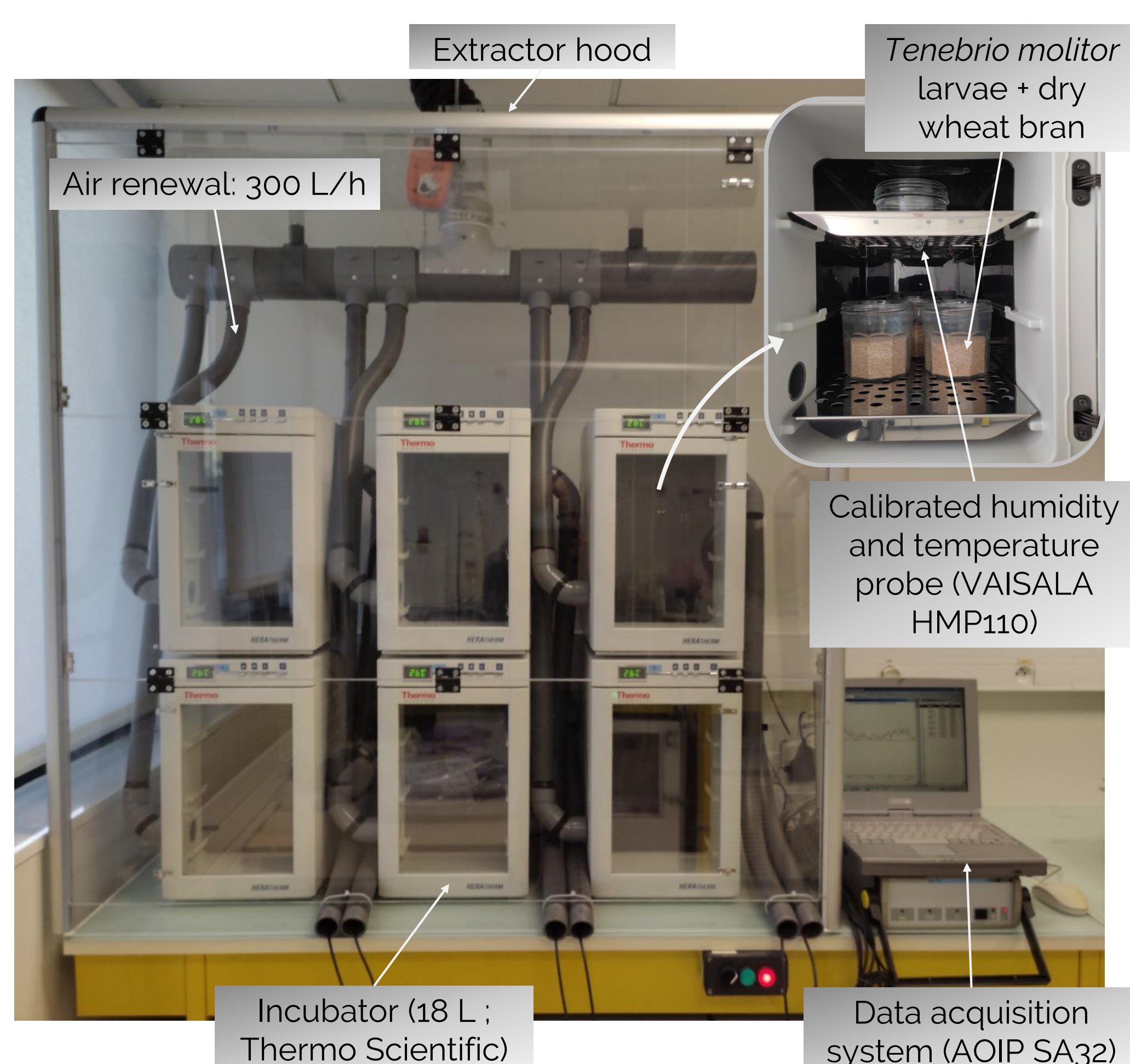
Spiking



Three levels of nDL-PCBs in wheat bran

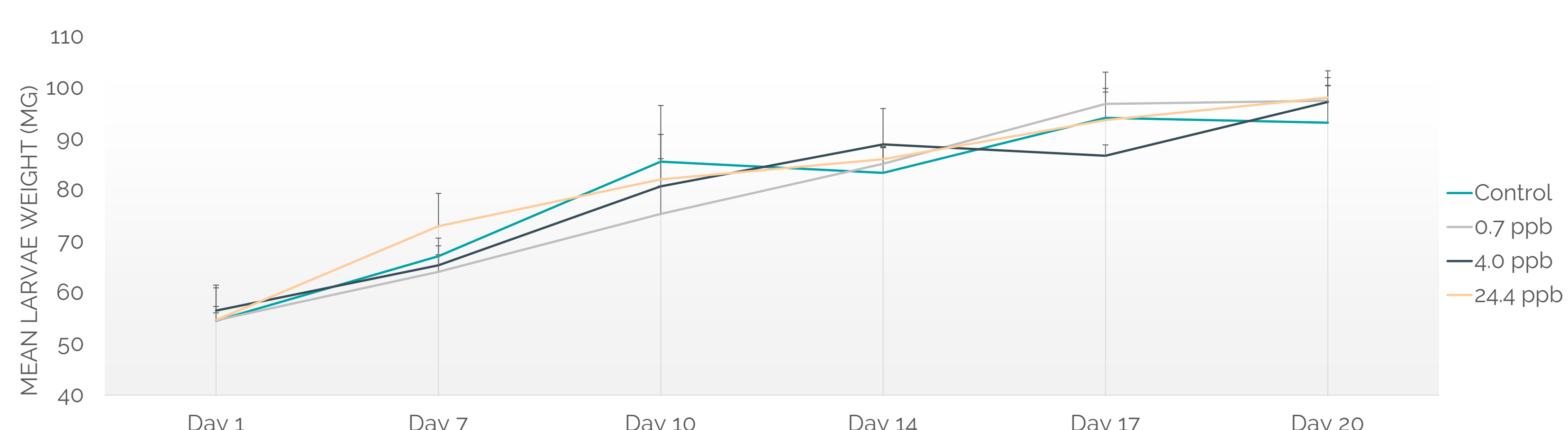
0.7 ppb / congener	0.4 × maximum level
4.0 ppb / congener	2.4 × maximum level
24.4ppb / congener	14.6 × maximum level

Tenebrio molitor rearing (20 days)



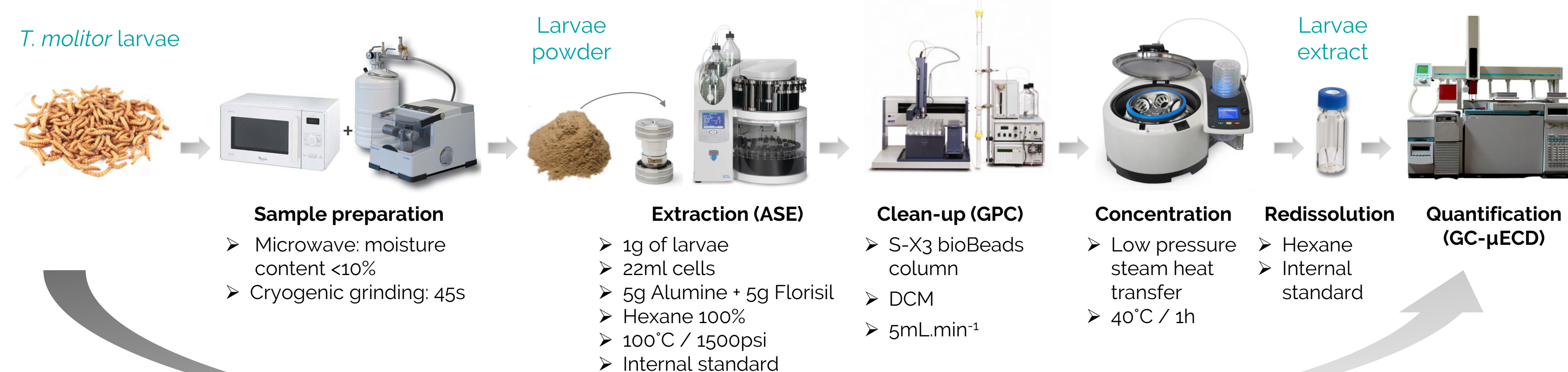
Results

Impact of PCB contamination on larval growth



➤ PCB contamination has no significant impact on the weight of larvae

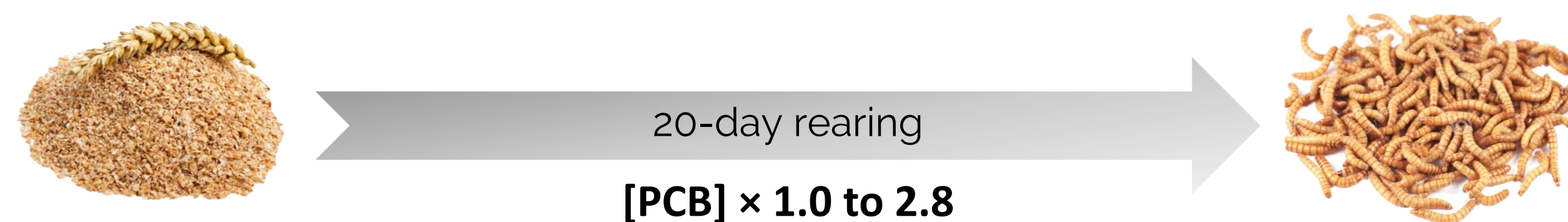
Analytical method set up



➤ Recovery rates: 98% - 129%
➤ RSD: 10% - 18%

Bioaccumulation factors

Bioaccumulation factor (BAF) = PCB concentration in larvae / PCB concentration in wheat bran



➤ No significant difference between spiking levels for low-molecular weight PCB congeners
➤ BAF increases with the contamination level for high-molecular weight PCB congeners

Conclusions



- No significant impact of PCBs on larval growth
- Bioaccumulation factors of up to almost 3
- Importance of monitoring the quality of the substrates used for farming insects as food and feed



References

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- [3] Guo, W., Pan, B., et al. (2019). Persistent organic pollutants in food: contamination sources, health effects and detection methods. *International Journal of Environmental Research and Public Health*, 16(22), 4361.