22 Transfer of aflatoxin, lead and cadmium from larvae reared on contaminated substrate to laying hens

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The use of low-grade substrates can improve the sustainability of insect-based feed production but also poses food safety risks. These include mycotoxins and heavy metals that may be present in substrates for insects. Thereby they might pass the entire production chain and lead to contaminated foods. We studied the transfer of three contaminants to black soldier fly larvae (BSFL) as well as eggs and poultry meat. Four poultry diets were formulated including four partially defatted BSFL meals (200 g/kg diet) produced at two different facilities. In Indonesia, BSFL were reared on not EU-approved meat-containing food waste, either non-spiked or spiked with environmentally relevant concentrations of Cd (1.9 mg/kg) and Pb (19 mg/kg) or aflatoxin B1 (1.5 mg/kg). As an additional control, in Switzerland, BSFL were reared on EU-approved substrates. Nine late-laying hens per treatment were fed the experimental diets for 4 weeks. Only the diet including BSFL reared on Cd contaminated substrate exceeded the EU-threshold for Cd for complete feed (1.7 mg/kg vs. 0.5 mg/kg). No diet affected laying performance or egg quality. Feeding the heavy-metal contaminated diet doubled Cd concentrations in breast meat and elevated Cd concentrations in kidneys and liver compared to the control. However, all eggs, meat and tissues (except kidneys) ranged below permitted limits for food. Our results show that, under certain conditions, even contaminated material can provide a suitable substrate to produce BSFL for use as feeds for poultry.