Effect of the hexane defatting step on the protein profiles and techno-functionalities of pea and mealworm ingredients

GRAVEL A. (1,2), DUBOIS-LAURIN F. (1,2), DOYEN A. (1,2), TURGEON S. (1,2)
1 Department of Food Sciences, UniversitLaval, Quec, Canada
2 Institute of Nutrition and Functional Foods (INAF), Quec, Canada

Recently, alternative proteins, mainly from pulses and edible insects, have gained popularity to support the global transition to more sustainable food systems. Nevertheless, sensory appeal and food neophobia represent major challenges which negatively affect the consumer acceptability. It was suggested that the integration of alternative proteins as ingredients (concentrate or isolate) in different food formulations could enhance consumer acceptability. Consequently, an increased knowledge of the effect of different processing methods on techno-functional properties of alternative protein ingredients is necessary. Multiple defatting and protein extraction methods have been explored to improve the protein recovery and purity. More specifically, efficient lipid removal from the solid food matrix remains conventional extraction by using hexane but its effect on novel proteins is still unknown. Consequently, this work aimed to evaluate the impact of the hexane defatting step on the protein profiles (2D SDS-PAGE, SEC-FPLC, surface hydrophobicity, ?-potential) and techno-functionalities (solubility, foaming, gelling and emulsifying properties) of pea (*Pisum sativum*) and mealworm (*Tenebrio molitor*) protein fractions. As expected, we showed that hexane-defatted (HD) fractions had higher protein contents. Moreover, protein profiles were similar between the defatted and non-defatted (ND) ingredients. However, for mealworm, actin and hexamerin were only detected in the HD fractions. We hypothesized that these soluble proteins were imprisoned in adipocyte cells (fat body) and released during hexane defatting. Furthermore, HD fractions showed improved foaming properties for both ingredients. Indeed, the foaming capacity of HD mealworm proteins increased by 588% due to the alteration of protein intrinsic molecular properties during the defatting process. Interestingly, the foam stability of pea proteins was especially improved by the hexane defatting step. Indeed, HD fractions formed a visibly smaller and denser air bubble network compared to ND pea protein fractions, which allowed for better stability of HD pea foams over time. Our findings can be used to improve the foaming properties of alternative protein fractions to generate high-value-added ingredients for food formulation.