Microbiology of processed edible insect products – Results of a preliminary survey

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Short Communication: Microbiology of processed edible insect products – results of a preliminary survey

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Abstract: Little is known of the microbiology of processed insect products. The present survey analysed a total of n = 38 samples of deep-fried and spiced (*Acheta domesticus*, *Locusta migratoria*, and *Omphisa fuscidentalis*), cooked in soy sauce ("tsukudani"; *Oxya yezoensis*, *Vespula flaviceps*, and *Bombyx mori*), dried (*A. domesticus, L. migatoria*, *Alphitobius diaperinus, Tenebrio molitor*, *B. mori*, *Hermetia illucens*, and *Musca domestica*), powdered (*H. illucens*, *T. molitor*) and other (incl. deep-frozen *B. mori* and honeybee pollen) insect products microbiologically (total bacterial count [TBC], *Enterobacteriaceae*, staphylococci, bacilli, and yeasts and moulds counts, salmonellae, *Listeria monocytogenes*, and *Escherichia coli*). Although each product type revealed a microbiological profile of its own, dried and powdered insects ("class I") displayed markedly higher counts than the deep-fried and cooked ones ("class II"). Thresholds between class I and II products were estimated at 4.0 (TBC), 1.0 (*Enterobacteriaceae*, yeasts and moulds), 2.5 (staphylococci), and 3.0 lg cfu/g (bacilli). All samples were negative for salmonellae, *L. monocytogenes, E. coli* and *Stapyhlococcus aureus*, but dried and powdered insects, as well as pollen, contained *B. cereus*, coliforms, *Serratia liquefaciens, Listeria ivanovii*, *Mucor* spp., *Aspergillus* spp., *Penicillium* spp., and *Cryptococcus neoformans*. Comparing the results with the hygiene criteria for edible insects proposed by Belgium and the Netherlands, class I products failed to comply with many bacterial count limits despite the absence of classical food pathogens. Therefore, class I products should always be consumed after another heating step as indicated by the manufacturer, until drying techniques are able to ensure lower bacterial counts.

[1] Abbreviations: BSF = black soldier fly, CNS = coagulase-negative staphylococci, EC = European Community, TBC = total bacterial count