Defining the response of *Mamestra brassicae* to mixed infections.

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The analysis of multiple dose-response assays usually focuses on overall response patterns of synergism or antagonism. It is rare that more complex response patterns are described that incorporate dose-level or dose-dependent specific synergism and antagonism. We will present an example where we have adapted models from recently developed ecotoxicological mixture dose-response analysis to specifically describe the mortality response of cabbage moth larvae *Mamestra brassicae* exposed to combinations of pathogens and toxins. This forms part of a larger study investigating whether baculoviruses can be combined with other entomopathogens to achieve improved biological control of insect pests. Larvae of *M. brassicae* were exposed in the laboratory to a closely related nucleopolyhedrovirus *Panolis flammea* NPV (*Pafl*NPV) or a homologous baculovirus *Autographa californica* NPV (*Acal*NPV) in mixtures with either *Bacillus thuringiensis* subsp. *kurstaki* (*Btk*), the pesticide Spinosad (active ingredients Spinosyns A & D) or the chemical Diethyldithiocarbamic acid (DETC) a sodium salt which has known suppression effects of the host immune system. To account for the antifeedant activity of *Btk* and Spinosad, the pathogen concentration received by each larva was adjusted relative to food consumption. Mortality of larvae due to each pathogen/toxin was assessed in each assay for 64 treatment combinations. Both *Pafl*NPV and *Acal*NPV interacted in a similar way in mixtures with *Btk* and displayed a significant level of synergism across several of the doses tested. The interaction between Spinosad/*Pafl*NPV and DETC/*Pafl*NPV was more complex but was described by the adapted ecotoxicology independent action model. The use of such models enables us to identify doses at which synergy with another pathogen or toxin can increase baculovirus mortality in a Lepidopteran host.