

OR033*Nutritional stress, behavioral development and honeybee health***Miguel Corona**, Jay Evans, Judy Chen, Jeff Pettis

In the United States populations of honeybees have experienced serious losses during recent years. Multiple possible causes for colony losses have been proposed, however no independent factor has been shown to be consistently associated to this phenomenon. Colony losses can be predicted by measuring the extent of open land relative to developed land area, suggesting that nutritional stress due to habitat loss is an important underlying factor associated to colony losses. Pollen is the main source of proteins and lipids for honeybees and its continuous supply is essential for colony growth and survival. We tested the effects of pollen deprivation at colony level to gain insight into the mechanisms connecting nutrition, behavioral development and honeybee health. For this purpose, we determine the effect of pollen deprivation on behavioral development, expression of molecular markers of behavior, expression of immune genes and virus load. We used triple cohort colonies to control colony size and demography and uncouple the effects of age and behavior on nurses and forager collected after two and three weeks of pollen deprivation. Our results showed that pollen deprivation induced accelerated behavioral development and that the behavioral state has a major effect on the expression of immune genes and virus load, with foragers having higher expression of immune genes and virus load compared with nurses. Our results also demonstrated that nutrition has a significant effect on the expression of immune genes and virus load: foragers of restricted colonies showed reduced levels of humoral immune genes and increased virus load compared to forager of non-restricted colonies. Overall, our results reveal that nutritional stress induced abnormal behavioral development, decreased immune function and higher susceptibility to diseases and support the proposal that nutritional stress is an important contributing factors associated with colony losses.