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Marisabel R Rodriguez (yun.kang@asu.edu), **Robert E Page** and **Yun Kang***
(yun.kang@asu.edu), Mesa, AZ 85212. *Effects of Vitellogenin in Age Polyethism and Population
Dynamics of Honeybees.*

We present basic but important assumptions that can help us understand the complexity of honeybee population dynamics given their nutritional status. We propose a non-linear differential equation system that models the population dynamics of brood and worker bees (nurses and foragers) within a colony. The dynamics of these populations are influenced by the available stored pollen in cells and the current levels of vitellogenin (VG), a major storage protein, in the fat body of nurse bees. Our model shows: (a) the importance of pollen collection and consumption rates, adequate feeding rates to the queen, and the impact of good nutrition during the larvae stage for future foraging activity; (b) the size of both the brood and worker populations at equilibrium are directly dependent upon the increase of levels of VG titers in nurse bees; (c) division of labor regulatory effects determined by the VG titers in nurse bees are important for balancing nurse bee and forager populations; (d) coexistence of both brood and worker populations is dependent upon available food for the brood (i.e. pollen collected and converted to VG and available foragers); (e) taking into account seasonal changes in pollen collection improves the prediction of long term consequences. (Received August 27, 2018)