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Wyatt A. Mangum (wmangum@umw.edu), 1301 College Ave, Fredericksburg, VA 22401, and **Suzanne Sumner*** (ssumner@umw.edu), 1301 College Avenue, Fredericksburg, VA 22401. *Worker Bee Aggression Towards a Foreign Queen: Comparing Deterministic and Stochastic Models with Empirical Data.*

When introducing a foreign queen into a colony, worker bees often display hostility known as balling. Ideally, the number of balling bees exponentially decays to zero before the queen's release; if not, she may be killed. Prior experimental work indicates that attendant bees increase balling duration and are associated with other erratic balling patterns. An initial deterministic model displays chaotic dynamics that mimic some of the aggression behaviors, but not other behaviors called reversions. Random disturbances could be the cause of reversions and the prior deterministic model is modified to include a stochastic term. Both mathematical models give the number of ballers on the introduction cage as a function of time. The results of the deterministic model and several runs of the stochastic model are compared to experimental data. The inclusion of the stochastic term simulates reversions and noisy fluctuations, as observed in the experimental data. This stochastic model is a first step at understanding the importance of the random initiation and cessation of balling among individual bees. Understanding how to minimize these uncertainties can make queen introduction more reliable with fewer queen losses. (Received December 04, 2008)