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*Mathematical Modeling of Data describing Worker Bee Aggression towards a Foreign Queen.*

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. Random disturbances could be the cause of these other behaviors 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. Including the stochastic term simulates noisy fluctuations and aggressive patterns called reversion 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 September 10, 2009)