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Foot-and-mouth disease virus (FMDV) is a very important trade-restricting livestock disease. In sub-Saharan Africa, buffalo act as reservoir for FMDV, challenging global eradication and local economies. However, little is known about the dynamics of FMDV in African buffalo. We conducted FMDV infection experiments to quantify epidemiologic parameters of FMDV transmission in buffalo, and a 3-year cohort study to document birth timing, and duration of maternal protection from FMDV infection. We used Bayesian inference to estimate parameters, and constructed a rigorous quantitative framework that explicitly incorporates individual variation in birth rates, waning of maternal antibodies, and epidemiological parameters into predictions about disease persistence from an individual-based stochastic model. We used our model to test the hypothesis that the buffalo's prolonged annual birth pulse may allow for endemic disease persistence, with the latest born calves of one year sparking the new epidemic in the earliest born of the following year's calf cohort. (Received August 07, 2019)