We discuss the existence and uniqueness results in stochastic differential equation models of the form $dX(t) = \mu(t, X(t), X(t-T))dt + \sigma(t, X(t), X(t-T))dB_t$, where $B_t$ is either regular Brownian motion or fractional Brownian motion with Hurst parameter $H > 1/2$. Furthermore, we use analytical and numerical results to compare the models and their persistence times. (Received September 21, 2015)