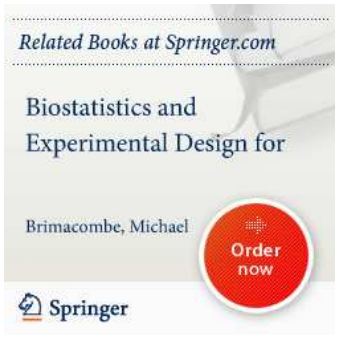


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# Multiphasic Individual Growth Models in Random Environments

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## *Abstract*

The evolution of the growth of an individual in a random environment can be described through stochastic differential equations of the form $dY_t = \beta(a - Y_t)dt + \sigma dW_t$, where $Y_t = h(X_t)$, $X_t$ is the size of the individual at age $t$, $h$ is a strictly increasing continuously differentiable function, $a = h(A)$, where $A$ is the average asymptotic size, and $\beta$ represents the rate of approach to maturity. The parameter $\sigma$ measures the intensity of the effect of random fluctuations on growth and $W_t$ is the standard Wiener process. We have previously applied this monophasic model, in which there is only one functional form describing the average dynamics of the complete growth curve, and studied the estimation issues. Here, we present the generalization of the above stochastic model to the multiphasic case, in which we consider that the growth coefficient $\beta$ assumes different values for different phases of the animal's life. For simplicity, we consider two phases with growth coefficients $\beta_1$ and $\beta_2$. Results and methods are illustrated using bovine growth data.

**Keywords** Multiphasic growth models - Stochastic differential equations - Estimation - Cattle weight

**AMS 2000 Subject Classification** 60H10 - 62G05 - 92D99

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