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Estimating Correlated Frailties in a Cox Model

The inclusion of random effects (frailties) in survival analysis has become a standard approach to account for hierarchical data structures. It is less common to include random regression coefficients ("random slopes"), perhaps due to both the computational complexity and the scarcity of datasets that support such modelling. Using four estimation methods available in standard software and previously published data from veterinary epidemiology, with animals clustered in herds, we demonstrate how the inclusion of herd-level correlated frailty terms may substantially affect fixed effect estimates and inferences. An additional simulation study provided a thought-provoking comparison of the performance of the four methods.