## MODELLING VARIANCES WITH RANDOM EFFECTS IN NON LINEAR MIXED MODELS WITH AN EXAMPLE IN GROWTH CURVE ANALYSIS

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In mixed models, variance components are generally assumed homogeneous across strata of the population under study. This presentation deals with models and related techniques to relax this assumption in non linear mixed models. The case of growth curve analysis modelled with a Gompertz function is shown as an illustration. Data analyzed concern 3058 weight performances on 265 individuals out of 5 strains of chicken divergently selected on weight at two ages (8 and 36 weeks). Twelve measurements from birth to 40 weeks of age were planified for each animal and individuals with more than 5 records were analyzed. Various models were considered for taking into account heterogeneity at the residual level. Models compared include log link functions relating the residual variance to covariates such as age (continuous and discrete) or strain, considered as fixed effects, and an individual or error term considered as Gaussian random variables. Classical models involving a residual variance proportional to a power of the conditional mean are also implemented. Inference is based on Bayesian methods and MCMC techniques via the Winbugs software. As shown by the DIC criterion, modelling residual variances, especially with random individual or error effects, considerably improves the efficiency of the analysis.