

CGIL Summer Course - 2007

5. Longitudinal Traits Genetic Evaluation and Parameter Estimation

1. Retrieve Fun5ped.d.(Pedigree file for large number of animals).
2. Retrieve Fun5dat.d.
3. Form a phenotypic covariance matrix from the data. Apply covariance functions to the matrix. Derive genetic and permanent environmental covariance matrices.
4. The analysis will use a random regression model.

$$y_{tij} = \mu_t + \sum \alpha_{ik} z_{ik} + \sum \beta_{ik} z_{ik} + e_{tij},$$

where z_{ik} are Legendre polynomials of order 3 based on the day when the observation was made, α_{ik} are the additive genetic regression coefficients for animal i , and β_{ik} are the animal permanent environmental regression coefficients. Generate 1 to 7 records per animal.

5. Estimate the genetic parameters for the random regression model.
6. How well do the estimated matrices fit the original covariance matrices?
7. Compute heritability for each of the 49 days and plot.
8. Compute genetic correlations of day 10 with all other days.
9. With the parameter estimates, compute genetic evaluations for all animals.
10. Compute EBVs for three specific days (i.e. days 10, 30, and 49) (from RR coefficients) for animals and plot those for a few animals. Do the animals rank the same for each day?
11. Think about a multiple trait model where one trait is longitudinal, one trait has maternal genetic effects, and one trait is longitudinal and also has maternal genetic effects. Make up the necessary covariance matrices.