

MAS and Chicken weight

Aim

MAS (malabsorption syndrome) is a disease among chickens. To study this disease, it was introduced in two groups of chickens in two different ways. The idea is that once we have a convenient way to obtain MAS diseased chickens under controlled conditions, that we can study the disease more closely, e.g. see how it develops, and compare different treatments. In this case study, we are interested in comparing the two groups of chickens with respect to the pattern in which their weight develops over time.

The data

The chickens are housed in pens, and pens are located in different departments. The data are in the file DataMAS.txt. The columns in the file are: department number, pen number within department, group, animal number within pen, time, and weight. When this case study is assigned to your group ask Bas for these data.

Model and analysis

You could consider introducing the departments as blocks in the analysis. Pens are obvious sources of dependence among animals. Observations are collected at a number of times. First, analyse these data with a simple classical mixed model, with random pens and random animals within pens and some simple function for time (like a simple polynomial or a spline).

- Briefly discuss why such a model is not likely to be appropriate for a final analysis.
- Inspect the plot of the residuals against the fitted values. Does this suggest an appropriate transformation of the data, and preferably one that would make sense from a biological point of view as well?
- Make plots of the data per animal against time, both for the original and transformed data and decide upon an appropriate way to model these patterns, taking proper account of likely dependence structures. So-called Trellis plots may come in handy here.

Think about a better model.

- Carefully formulate your model with all its assumptions.
- Motivate your model, and the techniques for estimation and testing that you are going to use.
- When in doubt, you may compare alternative approaches.
- Analyse the data, and present your conclusions, with appropriate estimates, standard errors, confidence intervals and test results.
- Check your model assumptions.
- Discuss possible weak points of your model or your analysis, if there are any.
- Present the programs in the software that you have used, e.g. R, in an appendix.

As a hint here are some key words: block effects, random pen effects, longitudinal data, stable variance, random coefficients regression, first order AR process.