Exercise: Cross-over experiment in mouse.

Aim of the study was to explore the effect of an insulin analog on blood glucose in dbdb mice.

The experiment took place on two experimental days, each mouse received different treatment (i.e. different dose of the insluin analog) on the two days.

Blood glucose was measured before treatment on each day (BG_0), and at specified time points in the interval 0-6 hours post dosing. The endpoint was AUC og blood glucose, which should be analysed on a log scale.

(The data is found as data set CrossOver)

1. Make a table, mouse x Experimental day with cells showing the applied dose. Which doses would you expect to be compared with higher precision?

2. Write a model with fixed effects of experimental day, dose, mouseID and with BG_0 as a covariate. Take out lsmeans for doses and differences between doses. Consider the stderr of the estimated differences. Is this consistent with your expectations?

3. Now change mouseID to be a random effect instead of a fixed effect. What happens to the estimated precisions of differences between treatments? What happens to the estimate of the covariate effect?

4. Construct two covariates for each mouse: the difference between BG_0 at day 5 and day 16, and the average of BG_0 at day 5 and day 16. Use both covariates in the model instead og BG_0, and investigate the estimated regression coefficients. Explain the results.