Linear models fit to Minimum Inhibitory Concentration (MIC) data on anti-microbial resistance

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Bacterial resistance to anti-microbial agents is often assessed using dilution series methods with in a highly mechanized fashion. The typical results are Minimum Inhibitory Concentration (MIC) values. For example, a series may contain the anti-microbial agent at concentrations of .12, .25, .50, 1, 2, 4 and 8 mg/L. A particular sample may show inhibition of growth at 2, 4 and 8 mg/L but growth at lower concentrations. The reported MIC value would then be 2 mg/L implying that a concentration of 2 mg/L showed inhibition, but a concentration of 1 mg/L did not show inhibition. In this presentation, we show how to fit linear models with fixed and random effects to this type of censored data using likelihood and Bayesian methods. AIC and DIC are used to discriminate among a set of models for a particular experiment. An example of comparing anti-microbial resistance between two different diets in poultry will be presented. Multiple barns of each type of diet were repeatedly visited. Fecal samples were collected on days 0, 10, 25, and 40 and the samples tested against an array of anti-microbial agents.