Chapter 9 Beyond complete randomization: blocking and covariates

Additional self-test questions

Q9.1 Your task is to compare the effect of four different garden slug-reduction strategies on densities of non-target invertebrates: is there anything you'd block on, or any covariates you'd measure?

If we could afford it, we'd do an invertebrate survey beforehand and use prior invertebrate density as a covariate. If we couldn't afford this, then it might make sense to block on type of garden (extensively paved, extensive grass, extensive vegetation), or perhaps on the extent to which the gardener said they controlled non-slug invertebrates.

Q9.2 For the experiment above, can you think of four different slug-reduction strategies?

Laying slug pellets; using mechanical barriers to keep slugs off plants; picking up and disposing of slugs you find; or actively attracting slugs into traps (e.g. with beer).

Q9.3 In a breeding facility for the pet trade, you are tasked with studying the effect of different post-birth diets on the mother's ability to bring up her young: is there anything you'd block on?

Take your pick from how many young she has, her previous reproductive history, and her general health pre-birth. We'd be inclined to block on the first two and avoid having obviously sickly dogs in the experiment.

Q9.4 Some students studied the link between whether a leaf had a leaf miner in it and the extent of caterpillar damage. They used a paired experimental design, collecting each mined leaf and pairing it with the nearest unmined leaf prior to evaluation of caterpillar damage on them both. Discuss the advantages and disadvantages of this approach.

The advantages are that the leafs in a pair should be similar in a lot of respects (other than having a miner) that are likely to affect caterpillar damage (same plant, same height off the ground, same exposure to the sun), thus comparison within the pair should make any effect of mining easier to spot than if a random selection of unmined leaves were compared with a random selection of mined leaves. We can't think of any disadvantages.