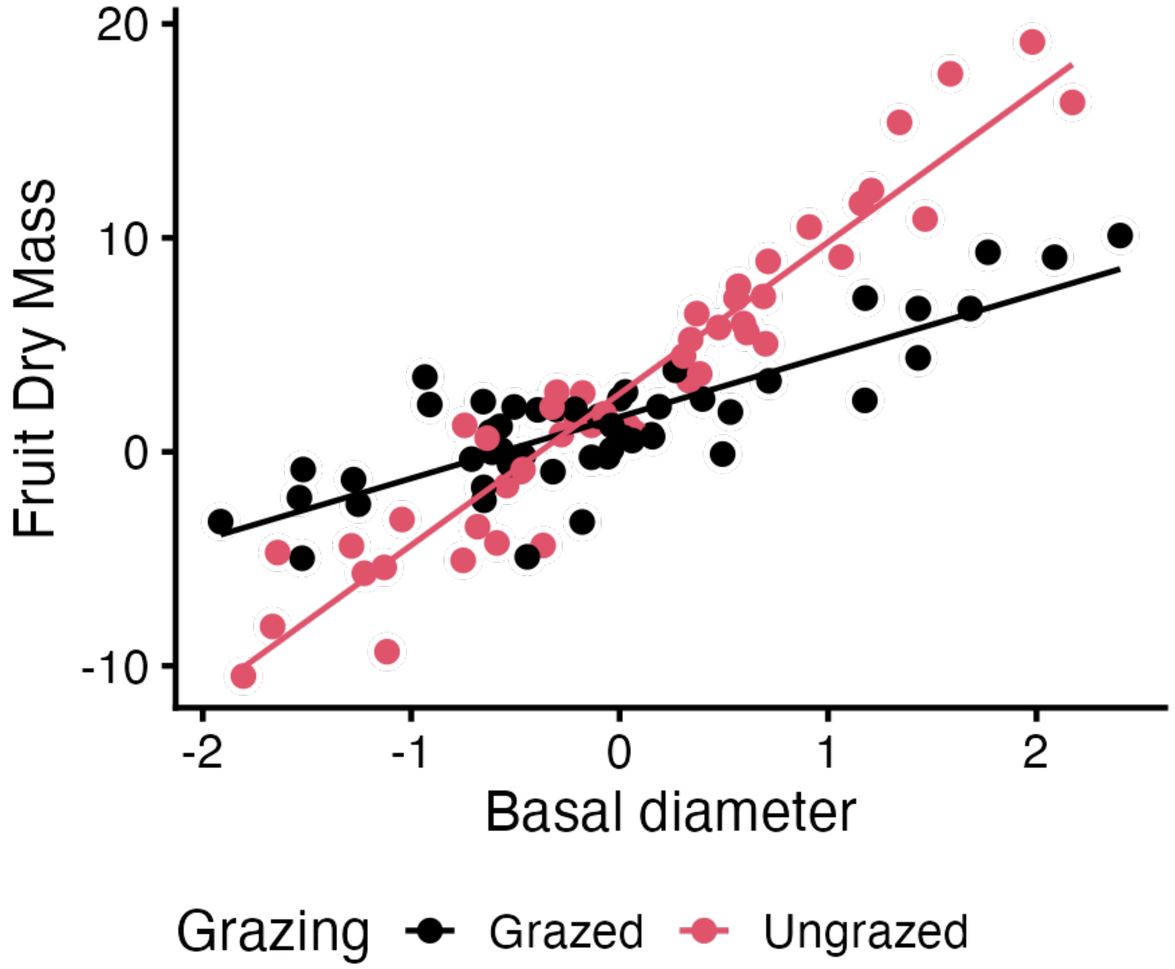
# Interactions

## Allowing coefficients to change according to other variables

- What if the relation between a predictor and an outcome changes depending on another predictor?
- We can account for this by adding product terms in the model
  - With two predictors, $x$ and $z$:

$$\mu = \alpha + \beta_1 x + \beta_2 z + \beta_3 xz$$

Interaction term!



# Example with interactions

- **Question**: what are the best soil moisture and light availability to grow tulips?
- Greenhouse experiment: beds of tulips kept in nine combinations of soil moisture and shading. Three replicates for each combination (total of 27 beds).
- **Response variable**: mean plant height in each bed
- **Predictor variables**:
  - Water:  3 levels (low, med, high)
  - Shade: 3 levels (low, med, high)

Data from: Grafen & Hails (2002) Modern Statistics for the Life Sciences.