Alistair's beet story

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2021-11-17

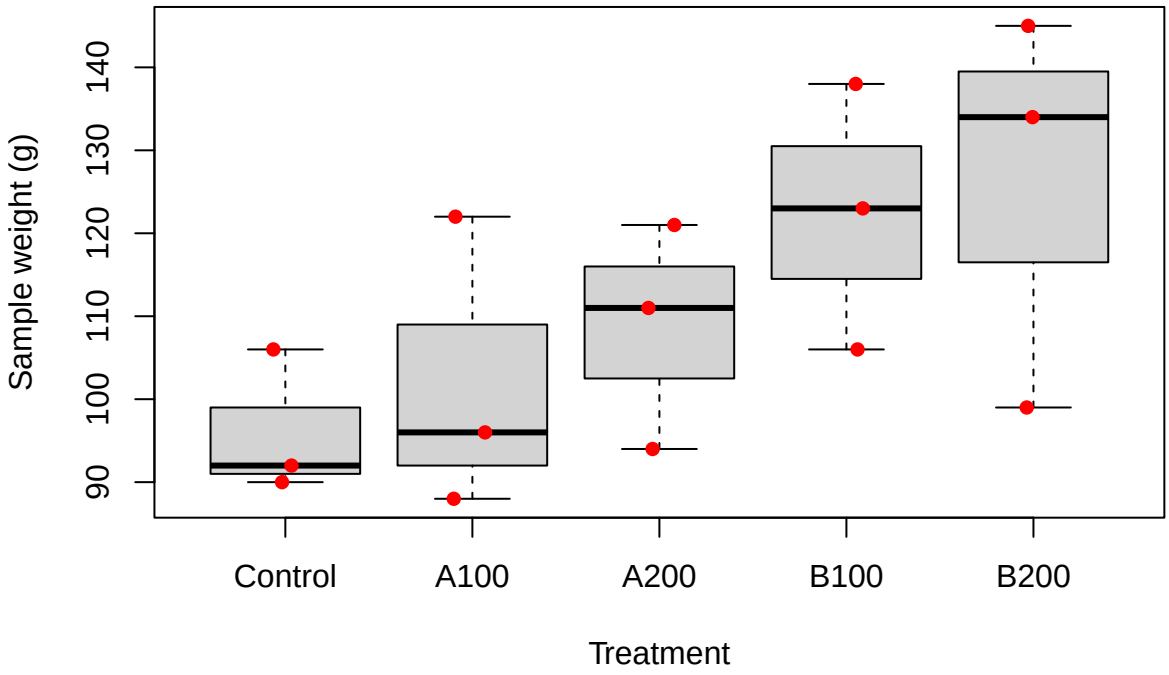
00 Background

The replication is too small to perform 2-way ANOVA legitimately in my opinion (best practice is 3 reps per main effect). E.g., you would be advised to have a minimum of n=6 reps for 2-way ANOVA and no interaction effect, but here you have n=3.

The design does not really fit a dose design based on the information I have (not enough dose levels or replication).

I would suggest 1-way ANOVA converting the 2 factors to a single one with 5 levels: control, A100, A200, B100, B200. With this analysis, post hoc tests would allow further mean comparisons, but the statistical power will probably be very low.

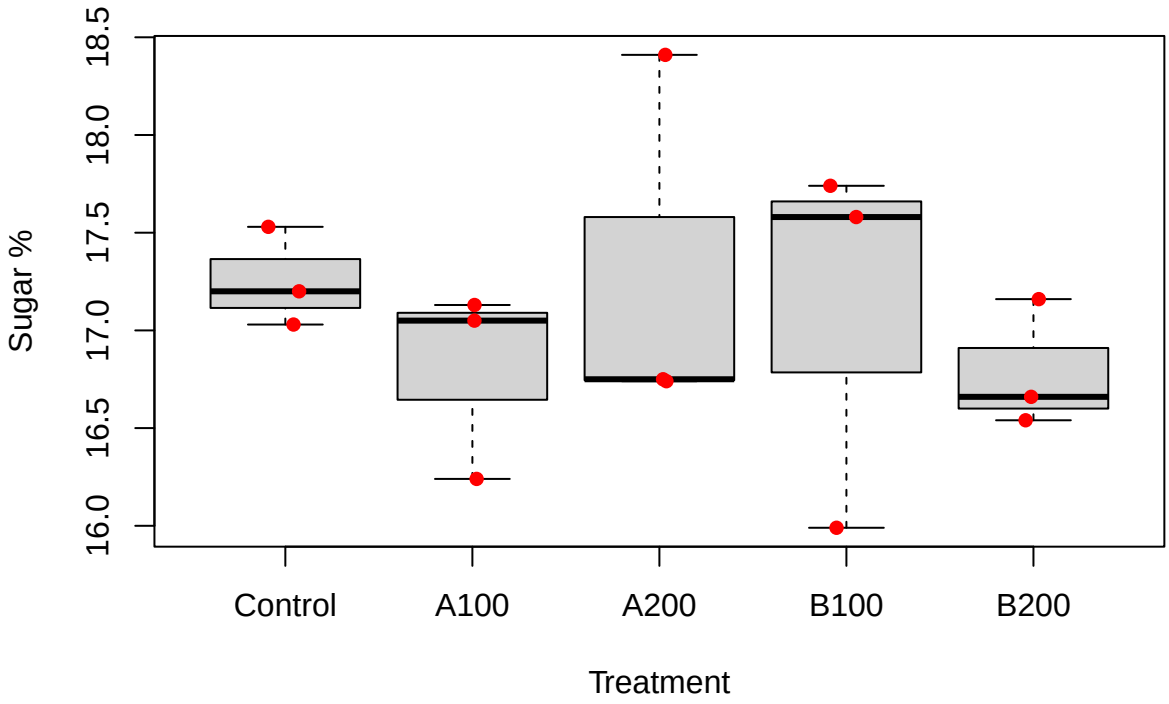
Plot_wt_g 1-way ANOVA and *post hoc*




```
##             Df Sum Sq Mean Sq F value Pr(>F)
## treat2       4   1995   498.7   1.766  0.212
## Residuals   10   2823   282.3

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Plot_wt_g ~ treat2, data = data)
##
## $treat2
##                    diff       lwr      upr     p adj
## A100-Control  6.000000 -39.15171 51.15171 0.9912011
## A200-Control 12.666667 -32.48504 57.81837 0.8815894
## B100-Control 26.333333 -18.81837 71.48504 0.3670426
## B200-Control 30.000000 -15.15171 75.15171 0.2591281
## A200-A100     6.666667 -38.48504 51.81837 0.9869600
## B100-A100    20.333333 -24.81837 65.48504 0.5946806
## B200-A100    24.000000 -21.15171 69.15171 0.4494124
## B100-A200    13.666667 -31.48504 58.81837 0.8513251
## B200-A200    17.333333 -27.81837 62.48504 0.7174852
## B200-B100     3.666667 -41.48504 48.81837 0.9986757
```

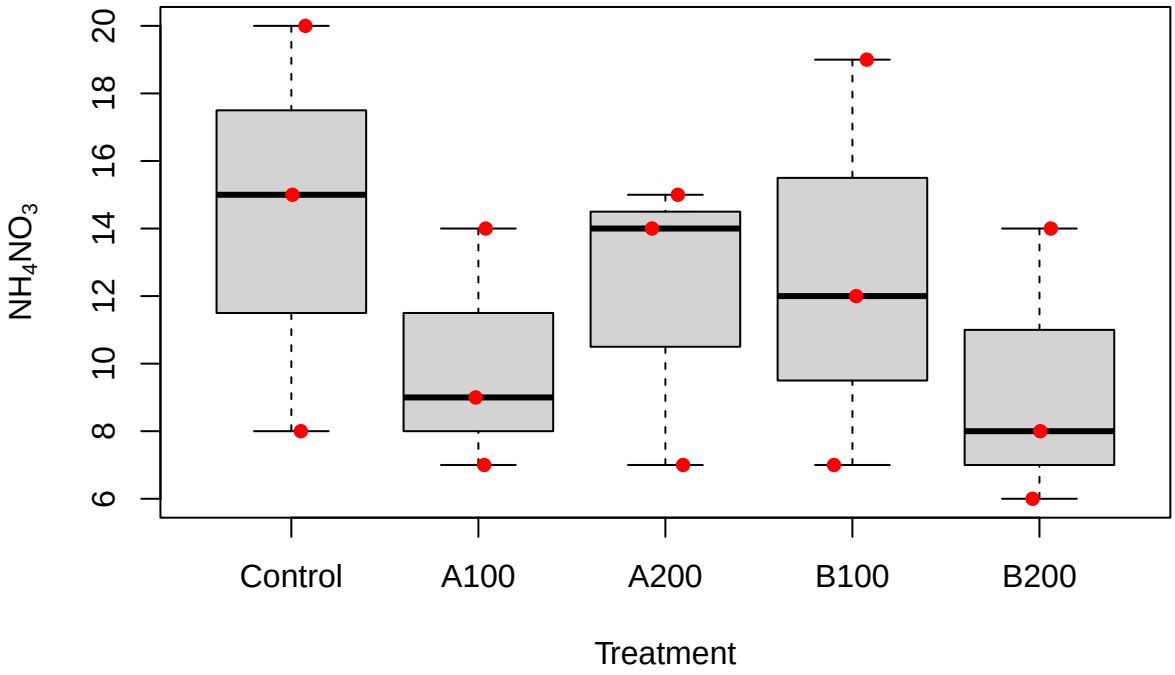
Sugar_pct 1-way ANOVA and *post hoc*




```
##             Df Sum Sq Mean Sq F value Pr(>F)
## treat2       4  0.706  0.1764   0.388  0.813
## Residuals   10  4.551  0.4551
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Sugar_pct ~ treat2, data = data)
##
## $treat2
##                     diff       lwr      upr     p adj
## A100-Control -0.44666667 -2.259386 1.366053 0.9213578
## A200-Control  0.04666667 -1.766053 1.859386 0.9999861
## B100-Control -0.15000000 -1.962720 1.662720 0.9985748
## B200-Control -0.46666667 -2.279386 1.346053 0.9094585
## A200-A100     0.49333333 -1.319386 2.306053 0.8921599
## B100-A100     0.29666667 -1.516053 2.109386 0.9809636
## B200-A100    -0.02000000 -1.832720 1.792720 0.9999995
## B100-A200    -0.19666667 -2.009386 1.616053 0.9959297
## B200-A200    -0.51333333 -2.326053 1.299386 0.8781465
## B200-B100    -0.31666667 -2.129386 1.496053 0.9758924
```

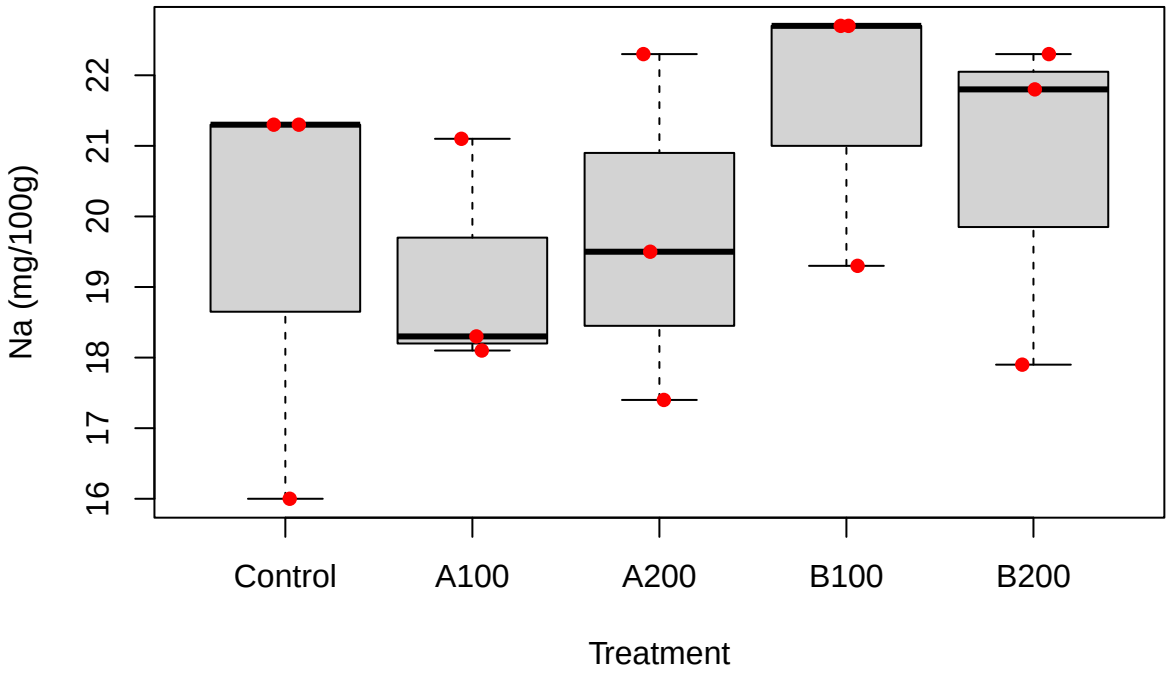
AmNit 1-way ANOVA and *post hoc*




```
##             Df Sum Sq Mean Sq F value Pr(>F)
## treat2       4  49.33   12.33   0.505  0.733
## Residuals   10 244.00   24.40

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = AmNit ~ treat2, data = data)
##
## $treat2
##                     diff       lwr       upr     p adj
## A100-Control -4.3333333 -17.60691  8.940245 0.8153928
## A200-Control -2.3333333 -15.60691 10.940245 0.9753443
## B100-Control -1.6666667 -14.94024 11.606912 0.9928950
## B200-Control -5.0000000 -18.27358  8.273578 0.7304090
## A200-A100     2.0000000 -11.27358 15.273578 0.9859438
## B100-A100     2.6666667 -10.60691 15.940245 0.9604623
## B200-A100    -0.6666667 -13.94024 12.606912 0.9998006
## B100-A200     0.6666667 -12.60691 13.940245 0.9998006
## B200-A200    -2.6666667 -15.94024 10.606912 0.9604623
## B200-B100    -3.3333333 -16.60691  9.940245 0.9163832
```

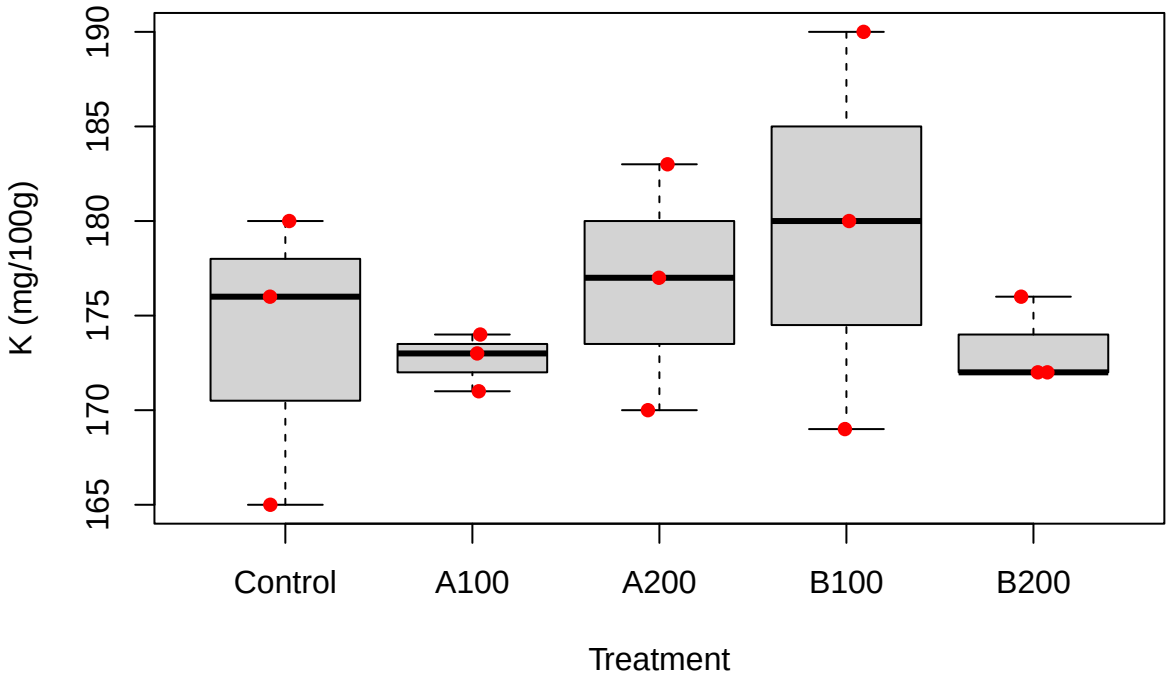
Sod 1-way ANOVA and *post hoc*




```
##             Df Sum Sq Mean Sq F value Pr(>F)
## treat2       4  11.38   2.845    0.51   0.73
## Residuals   10  55.75   5.575

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Sod ~ treat2, data = data)
##
## $treat2
##                    diff       lwr      upr     p adj
## A100-Control -0.3666667 -6.711621 5.978288 0.9996526
## A200-Control  0.2000000 -6.144955 6.544955 0.9999687
## B100-Control  2.0333333 -4.311621 8.378288 0.8247642
## B200-Control  1.1333333 -5.211621 7.478288 0.9738903
## A200-A100     0.5666667 -5.778288 6.911621 0.9980812
## B100-A100     2.4000000 -3.944955 8.744955 0.7276125
## B200-A100     1.5000000 -4.844955 7.844955 0.9313291
## B100-A200     1.8333333 -4.511621 8.178288 0.8704906
## B200-A200     0.9333333 -5.411621 7.278288 0.9871398
## B200-B100    -0.9000000 -7.244955 5.444955 0.9887663
```

Pot 1-way ANOVA and *post hoc*




```
##             Df Sum Sq Mean Sq F value Pr(>F)
## treat2       4  103.1   25.77   0.584  0.682
## Residuals   10  441.3   44.13

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Pot ~ treat2, data = data)
##
## $treat2
##                     diff       lwr      upr     p adj
## A100-Control -1.0000000 -18.85157 16.85157 0.9996928
## A200-Control  3.0000000 -14.85157 20.85157 0.9790397
## B100-Control  6.0000000 -11.85157 23.85157 0.7999321
## B200-Control -0.3333333 -18.18491 17.51824 0.9999961
## A200-A100     4.0000000 -13.85157 21.85157 0.9425598
## B100-A100     7.0000000 -10.85157 24.85157 0.7025611
## B200-A100     0.6666667 -17.18491 18.51824 0.9999386
## B100-A200     3.0000000 -14.85157 20.85157 0.9790397
## B200-A200    -3.3333333 -21.18491 14.51824 0.9694197
## B200-B100    -6.3333333 -24.18491 11.51824 0.7687409
```