

Diet Restriction and Longevity

Scientists have noted that decreasing caloric intake can lead to increased life expectancy as well as decreasing risk of cancers and other diseases. In the following study female mice were randomly assigned to one of six diets:

- **NP**: no restriction standard diet
- **N/N85**: normal diet before and after weaning (85 kcal/week after weaning)
- **N/R50**: normal before and restricted after weaning to 50 kcal/wk
- **lopro**: the same as N/R50 but with protein content reduced with age
- **N/R40**: normal before and restricted to 40 kcal/week after weaning
- **R/R50**: restricted before and after weaning to 50 kcal/week.

The response variable is the number of months survived (Figure 1 and Table 1)

There are several questions of interest:

- Does lifetime on the 50 kcal diet exceed that on the 85 kcal diet?
- Is lifetime affected by restricting calories prior to weaning with a 50 kcal diet after weaning?
- Does lifetime on a 40 kcal/week diet exceed that on a 50 kcal/week regime?
- Given a reduced diet of 50 kcal/week, does restricting protein have any effect on lifetime?
- Is there an effect on lifetime due to restricting to a 85 kcal/week diet?

Diet	n	mean	SD
lopro	56	39.7	7.0
N/N85	57	32.7	5.1
N/R40	60	45.1	6.7
N/R50	71	42.3	7.8
NP	49	27.4	6.1
R/R50	56	42.9	6.7

Table 1: Summary statistics for lifetimes on six diets.

Analysis of Variance Table

Response: LIFETIME

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
DIET	5	12733.9	2546.8	57.104	< 2.2e-16 ***
Residuals	343	15297.4	44.6		

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Kruskal-Wallis chi-squared = 159.0128, df = 5, p-value = < 2.2e-16

Tables of means

Grand mean

38.79713

	lopro	N/N85	N/R40	N/R50	NP	R/R50
	39.69	32.69	45.12	42.3	27.4	42.89
rep	56.00	57.00	60.00	71.0	49.0	56.00

Tables of effects

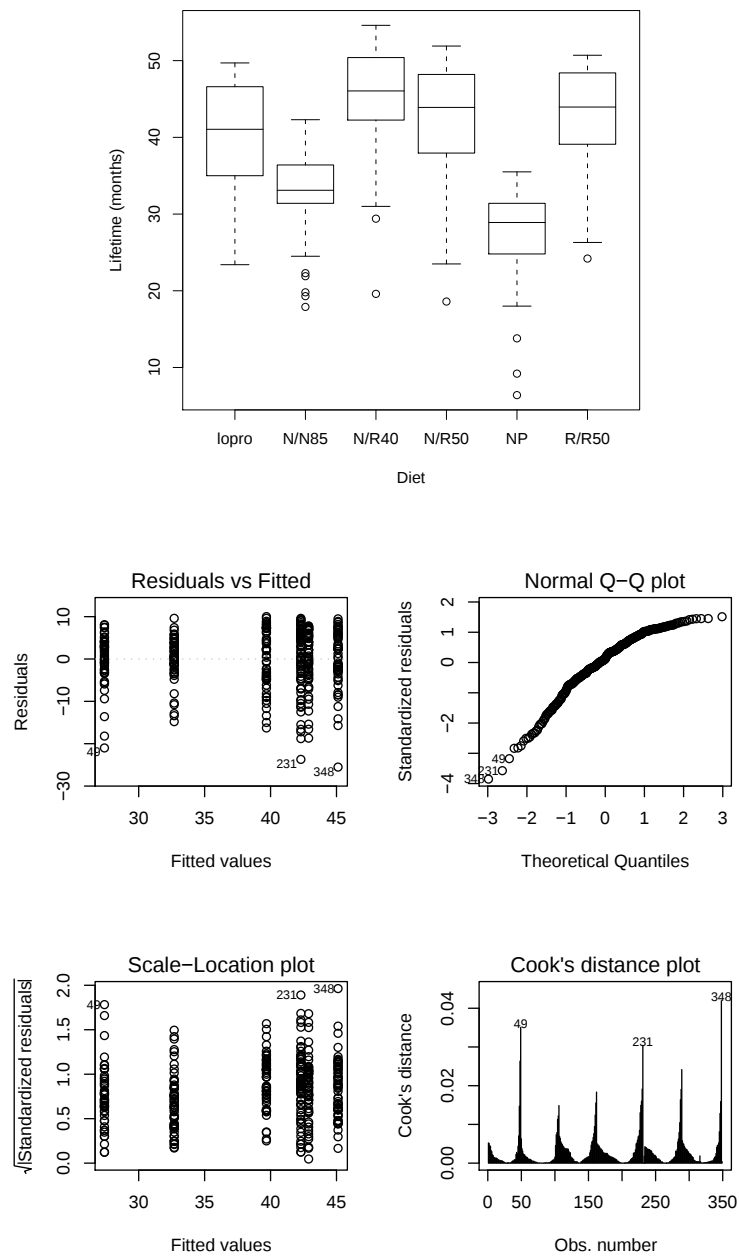
DIET

	lopro	N/N85	N/R40	N/R50	NP	R/R50
	0.8886	-6.106	6.32	3.5	-11.40	4.089
rep	56.0000	57.000	60.00	71.0	49.00	56.000

Contrasts:

	Est	SE	CI L	CI U	t-stat	p-value
[1]	-9.61	1.19	-11.94	-7.27	-8.09	0.00
[2]	-0.59	1.19	-2.94	1.76	-0.49	0.62
[3]	2.82	1.17	0.52	5.12	2.41	0.02
[4]	-2.61	1.19	-4.96	-0.26	-2.19	0.03
[5]	5.29	1.30	2.73	7.85	4.07	0.00

Figure 1: Lifetimes of female mice on six different diet regimes (top) and oneway AOV diagnostics.



95% family-wise confidence level

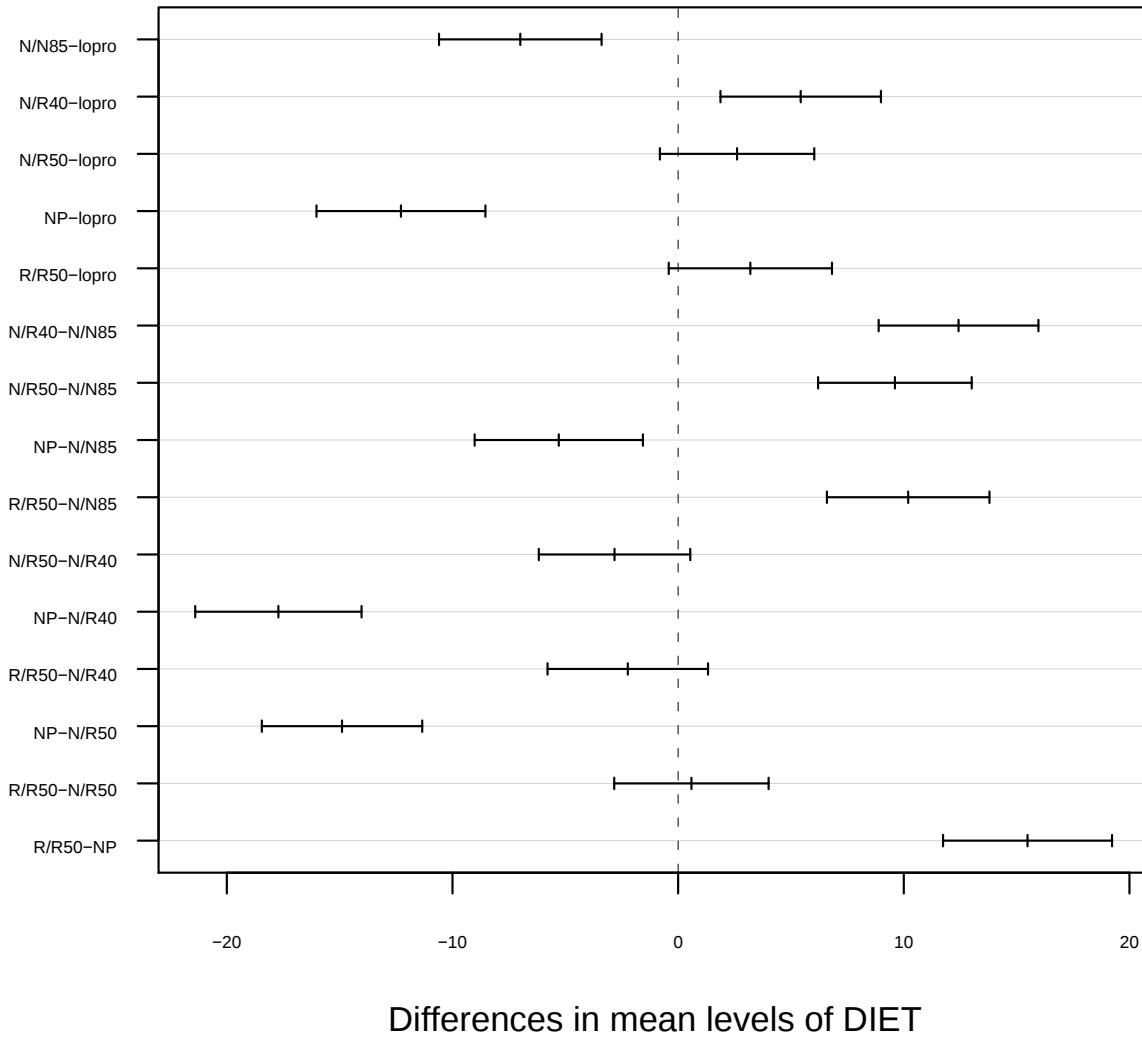


Figure 2: Tukey HSD intervals for all 2 way comparisons