IA1

Jake VanCampen

Oct 26 2017

Results

This analysis explored the relationship between a protein enriched diet and mean fish size as measured by both standard length (mm) and weight (mg). The following hypotheses were tested here:

H_0: Feeding zeebrafish an enriched diet will not significantly affect their mean size after two months
H_A: Feeding zebrafish an enriched diet will significantly affect their mean size after two months

Eploratory data analysis revealed two erroneous data points that were removed from the dataset. Zebra fish fed an enriched diet were found to have a significantly higher mean standard length (Welch two sample t-test, $t(195.98) = $ -16.27, $p < 0.001$) and mean Weight (Welch two sample t-test, $t(190.90) = $ -14.08, $p < 0.001$) compared to the non-enriched diet (Fig. 1, Table 1). The normality assumptions necessary to perform a parametric T-test were validated using a bootstrap resampling approach, and the null hypothesis that there is no significant effect of an enriched diet on mean fish size was rejected.

There is a significant relationship between standard length (mm) and weight (mg) $F1,196 = 1643$, $p < 0.001$, r-squared = 0.893 (Figure 2, Table 2). The relationship was fit using a type I linear model. In total these results accept the alternative hypothesis that zebrafish mean size is affected by a protein enriched diet as compared to the control, and show that both weight (mg) and standard length (mm) have a strong linear relationship showing the same increase in mean size with diet change.
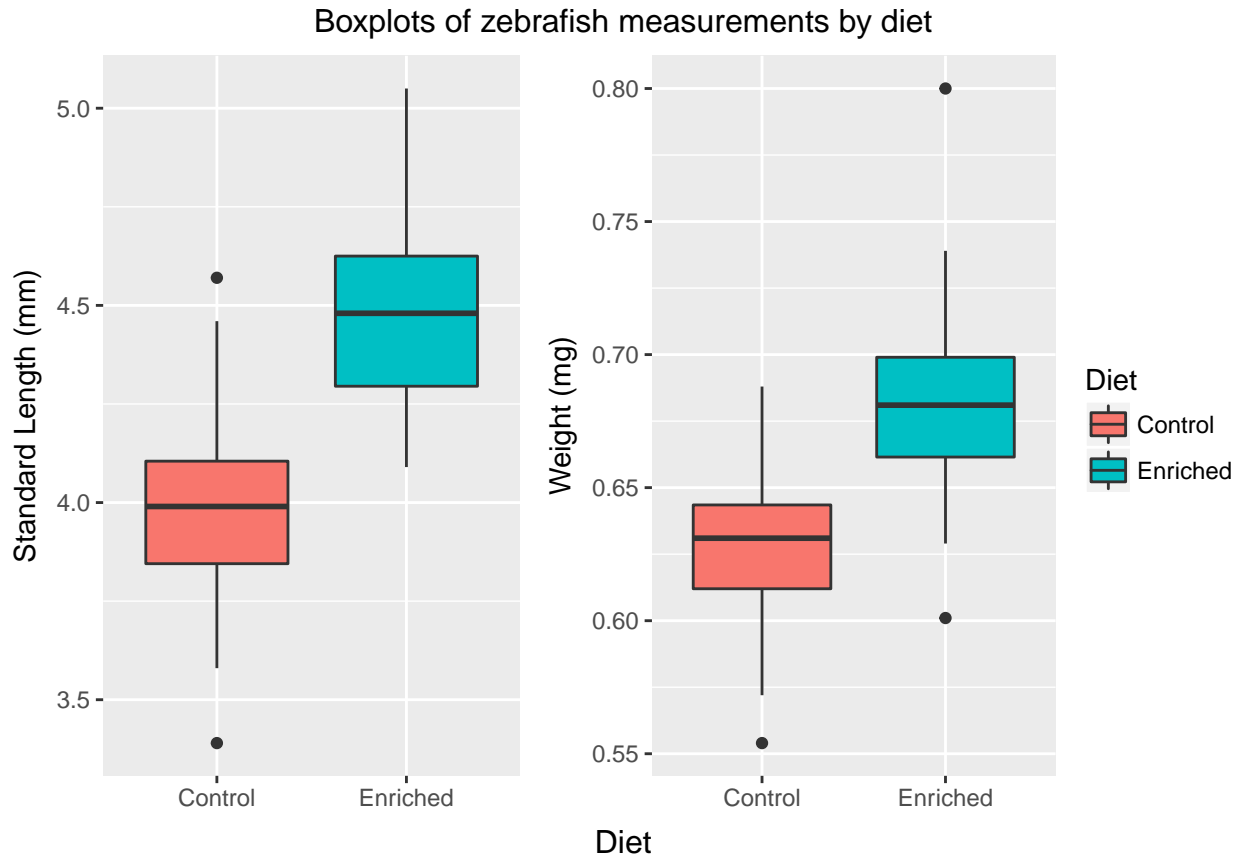

Figure 1. Boxplots showing the change in both standard length (mm) and Weight (mg) with a change in diet.

Table 1. Summary statistics for zebra fish measuremnets by diet.

Diet	SL_mean	Weight_mean	SL_sd	Weight_sd	SL_var	Weight_var
Control	3.982	0.630	0.211	0.023	0.045	0.001
Enriched	4.473	0.681	0.213	0.027	0.046	0.001

The relationship between weight and standard length over a change in diet

$y = 0.104\, x + 0.216$, $r2 = 0.893$

Weight (mg)

Standard Length (mm)
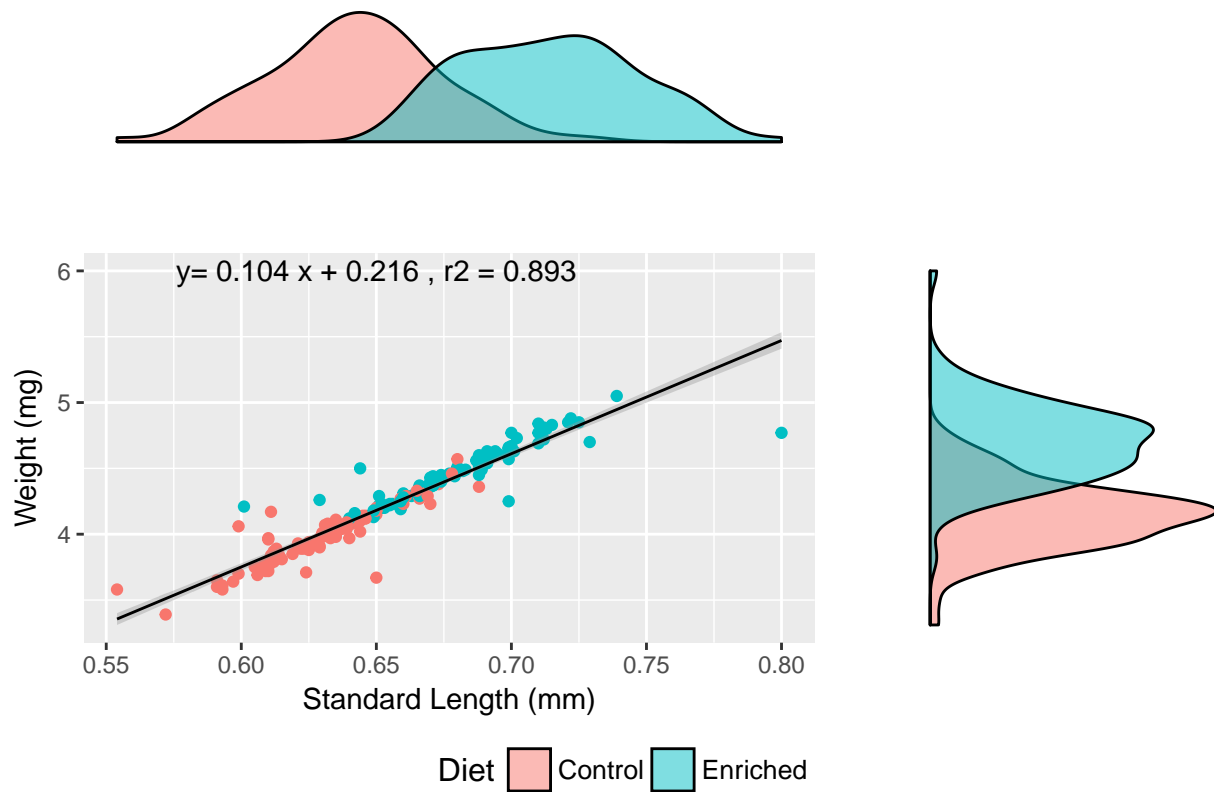
Diet ☐ Control ☐ Enriched

Figure 2. A type I linear model was fit to the relationship between standard length and weight, finding a significant positive relationship, $F1,196 = 1643$, $p < 0.001$ (Table 2).

Table 2. Regression statistics for the type I linear model of the relationship between standard length (mm) and weight (mg) of the zebra fish.

r.squared	adj.r.squared	sigma	F-stat.	p.value	df	logLik	AIC	BIC	deviance	df.residual
0.893	0.893	0.012	1643.022	0	2	601.125	-1196.251	-1186.386	0.027	196