

Changes in Reproduction and Growth in Response to Food Availability In *Sceloporus undulatus*

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Introduction

Organisms have a limited amount of energy available for growth and reproduction (Smith and Fretwell 1974). The total amount of energy available changes seasonally and throughout the year as the environment changes (Ferguson et al. 1982). *Sceloporus undulatus*, the Eastern Fence Lizard is a widespread, insectivorous lizard. We sought to identify how shifts in food availability affect the growth, reproduction, and energy storage of these lizards

Methods

We collected 24 male:female pairs of *S. undulatus* from two distinct populations: Edgar Evins State Park, Silver Point, Tennessee and Standing Stone State Park, Hilham, Tennessee (approximately 56 km apart).

We measured each individual for body mass (g), snout-vent length (SVL) (mm), and tail length (mm).

Male:female pairs from the same locations were housed in 42 x 42 x 76 cm mesh cages with a block for sunning, nest pot for laying eggs, and fake vines for cover. Cages were housed in the TN Tech Aviary.

Lizards were fed 10 vitamin dusted crickets per cage for a control diet (n = 5 crickets) until they laid a clutch, after which they were given either 6 crickets for a low diet (n = 3 crickets), and 20 crickets for a high food diet (n = 10 crickets) three times a week.

Cages were checked daily for eggs

Clutch sizes were recorded and each egg was measured for mass (g), length (mm), and width (mm)

After the breeding season, surviving adults were measured, euthanized, and dissected and we measured their liver (g), fat pads (g), and ovaries/testes (g)

Results

Through linear modeling we found a significant interaction between the lizards' sex and the food treatment (t = 3.04, p = 0.01)

they were on in terms of reproductive energy investment (i.e. mass of the follicles/testes at dissection)

Energy storage (i.e. liver mass (g) + fat pads mass (g)) was significantly higher in the high food treatment than the low (t = 3.04, p = 0.01).

There were differing trends in mass over time between treatments; however, these were not statistically significant

Conclusion

Trends of higher growth, energy storage, and energy put towards reproduction can be seen with more food availability. Lizards with more energy available to them can put more energy towards reproduction as well as store more energy for the next breeding season. There is significant difference in mass allocated for reproductive organs between males and females, likely because females must put energy towards growing eggs, rather than just testes. The lower ovary/teste mass for the control individuals was likely because these were the ones that hadn't laid a clutch yet and may not have been sexually mature.

Future Direction

We are currently looking at how clutch sizes and masses alter seasonally and year to year resulting from change in food availability due to seasonal fitness decline and changes in rainfall, which previous studies have shown to effect insect populations (Parker and Pianka 1975, Turner 1973).

Literature

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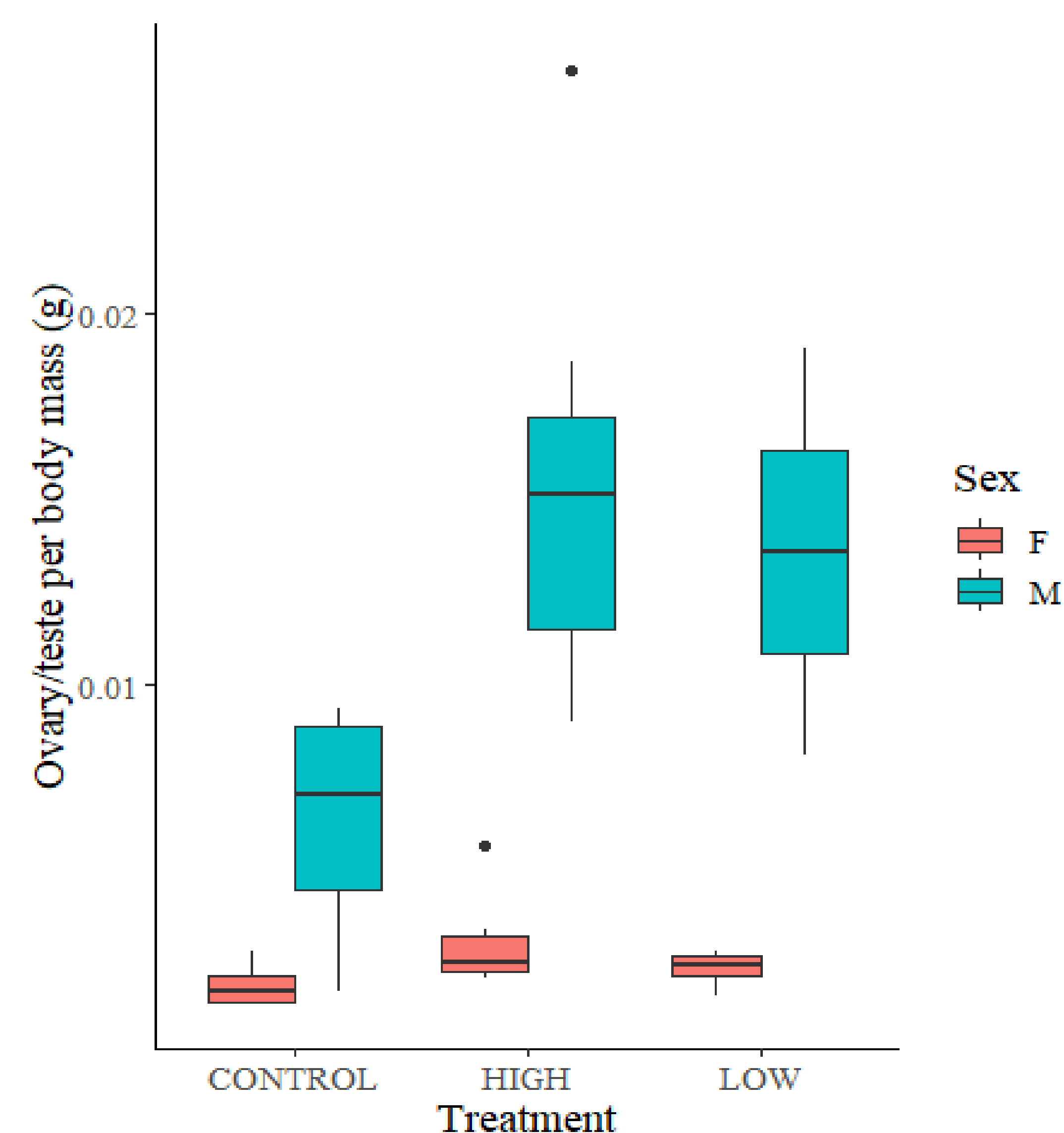


Figure 1. Ovary/teste mass in relation to body mass by sex. Significant interaction between sex:treatment in relation to ovary/teste mass (t = 3.04, p = 0.01)

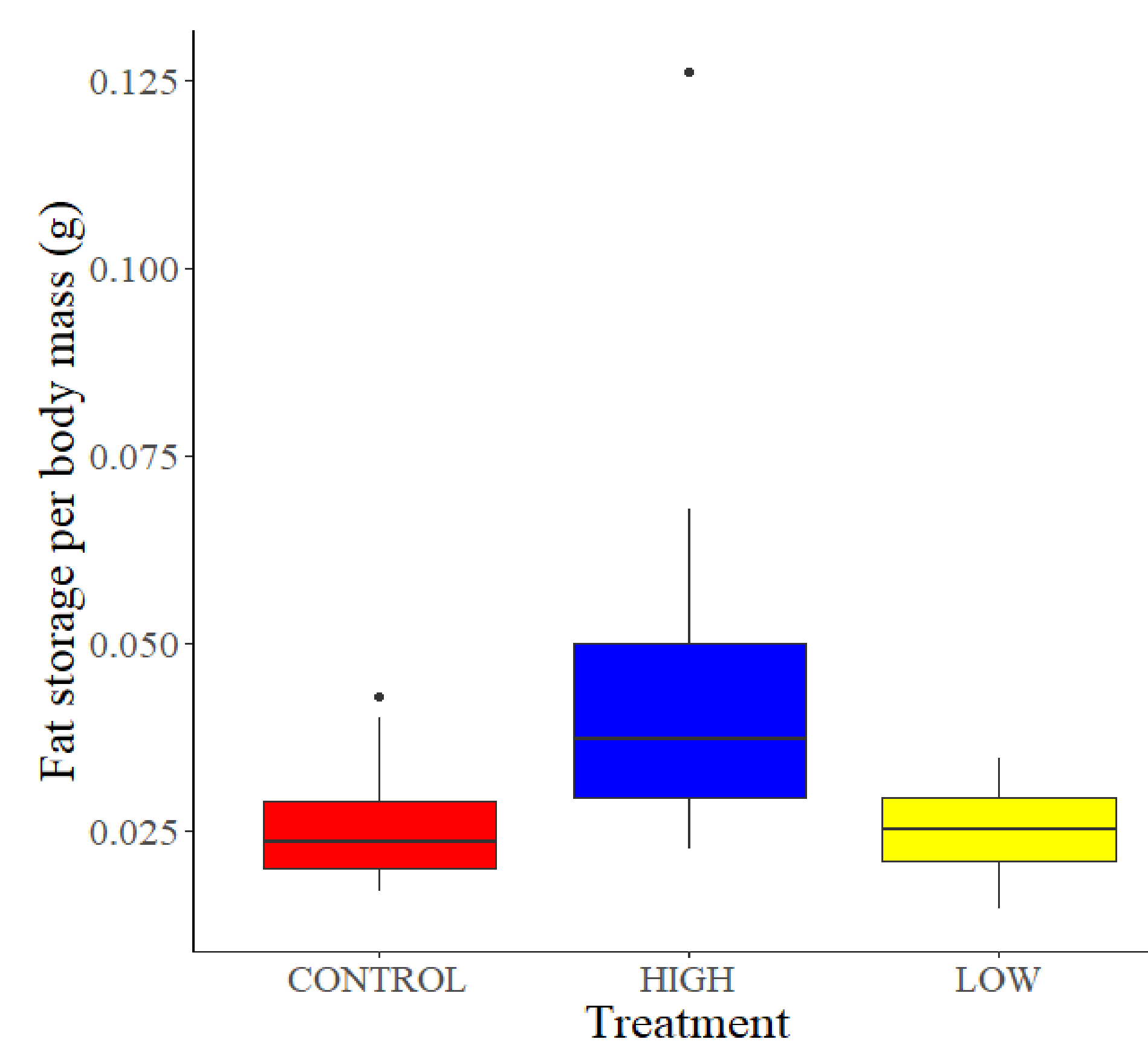


Figure 2. High food treatment individuals had more significantly more mass stored in their fat pads and liver than the low treatment did (t = 3.04, p = 0.01)

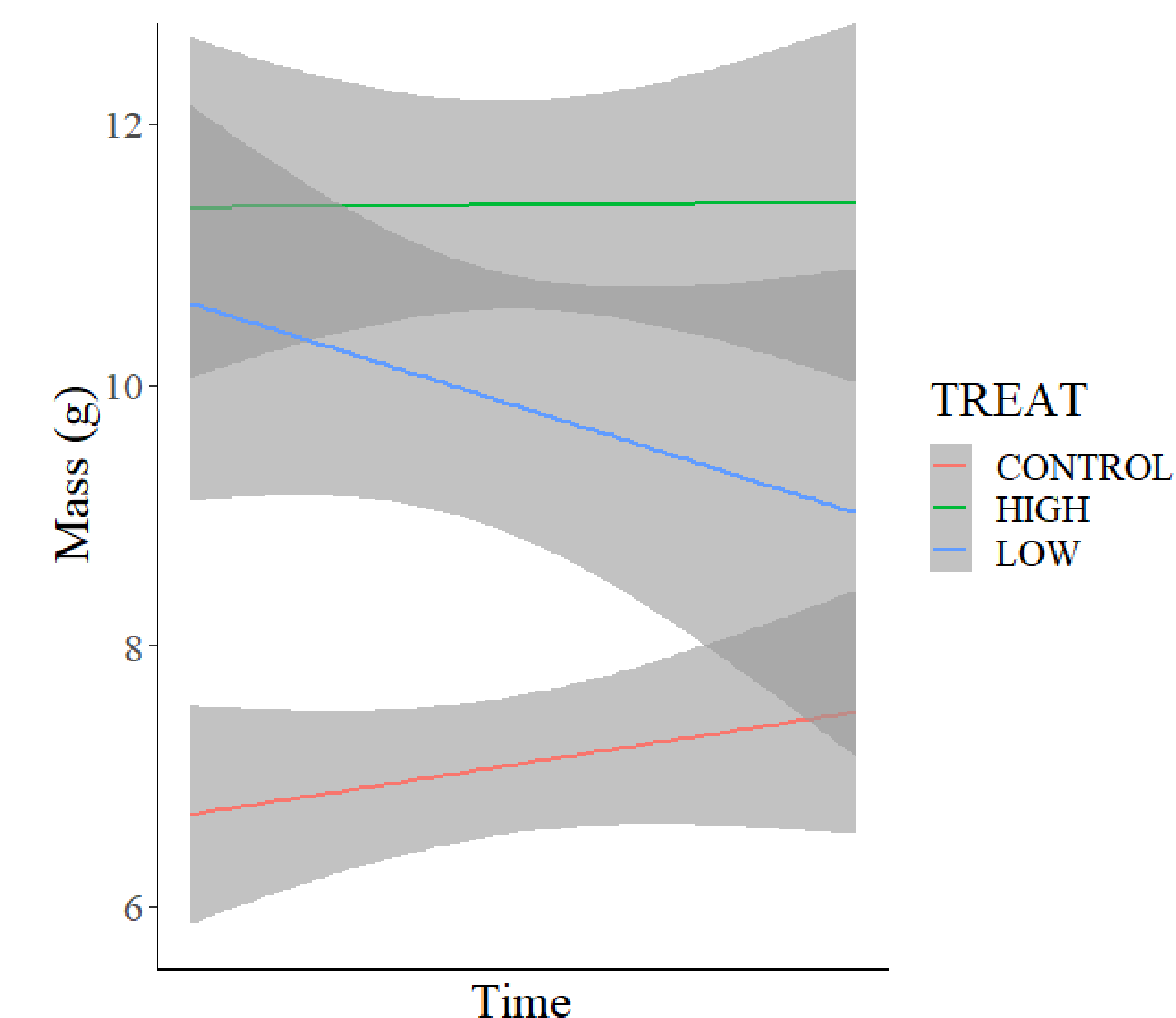


Figure 3. Mass over time based on food treatment. Visible trends but no statistical significance due to overlap

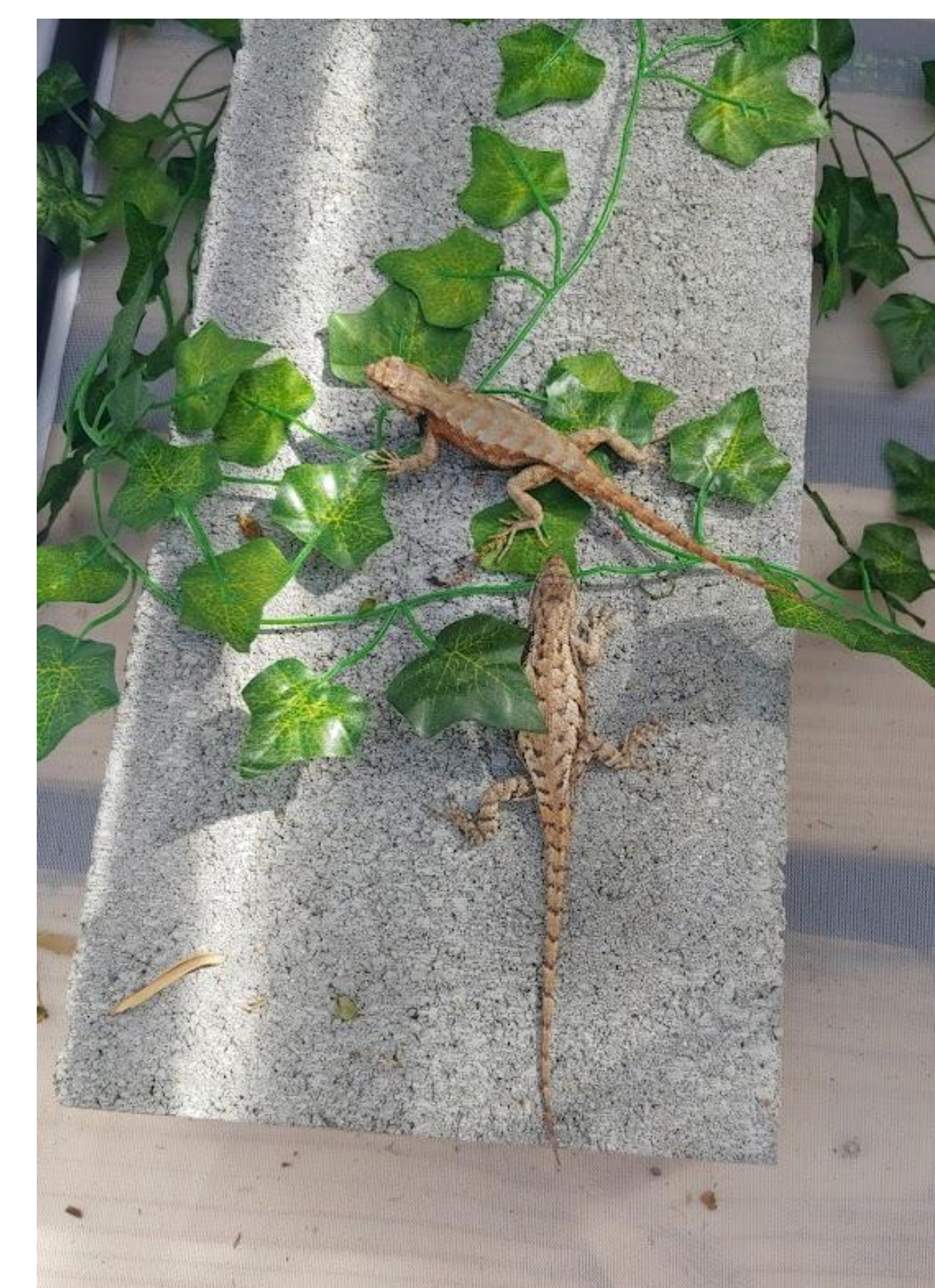


Figure 4. *S. undulatus* pair in their enclosure