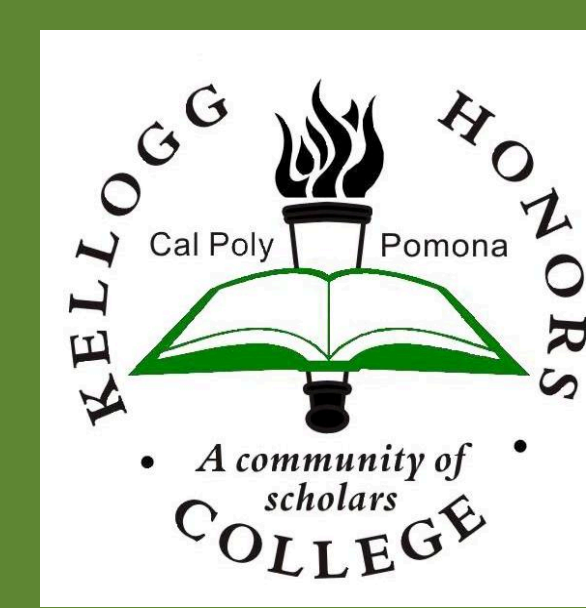




Vitamin B₁₂ Supplement Effect on Desert Tortoise Weight

David Frausto, Animal Science

Mentor: Dr. Hyungchul Han | Co-Researcher: Haley Chipeco-Rubia
Kellogg Honors College Capstone Project



Abstract

As of 1990, Desert Tortoises have been categorized as a threatened species by the U.S. Fish and Wildlife Service. Therefore, any health-related issue requires immediate action; this project will focus on obesity in Desert Tortoises. Obesity in Desert Tortoises has the potential of becoming fatal because of several issues that accompany the condition. These issues include fat deposits forming around the front and back legs which hinder the ability to retract extremities into their shells. Consequently, this can lead to internal and systemic complications, infections, and strain on the body. The treatment for obesity typically consists of increasing activity levels and dietary management. Vitamin B₁₂ is a supplement that is associated with many physiological functions including normal neurological function, red blood cell production, DNA synthesis, and the production of the mood affecting substance SAME (S-adenosyl-L-methionine). Diets that are primarily vegetarian or vegan-based, such as tortoise diets, tend to be deficient in vitamin B₁₂ which can lead to episodes of tiredness and weakness that can contribute to obesity. Therefore, by supplementing vitamin B₁₂ in the diets of obese Desert Tortoise, there is a potential of having weight loss. This is a computational, nutritional study that analyzed the data of 16 organizations/private owners that incorporated supplements with vitamin B₁₂ into diets to determine if there is recorded weight loss. The comprehensive data showed that there was no recorded weight loss in the Desert Tortoises that were given a supplement with vitamin B₁₂.

Introduction

- Desert Tortoises have been categorized as threatened species since 1990 by the U.S. Fish & Wildlife Service.
- Any condition that can become fatal in Desert Tortoises is a cause for concern since they are a threatened species.
- Obesity can cause infected sores, internal injuries, strain on the body, and in severe cases, death.
- Vitamin B₁₂ physiological functions includes normal neurological function (nerve cell activity), erythropoiesis, DNA synthesis, and the production of the mood affecting substance SAME (S-adenosyl-L-methionine)
- Vitamin B₁₂ has been known to decrease levels of tiredness and weakness which can be caused by obesity.
- If vitamin B₁₂ can be incorporated into the diet through the addition of multivitamin supplements, then there can be a possibility of weight loss.

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Methods & Materials

- A comprehensive survey was emailed to 63 organizations that had Desert Tortoises.
- Survey consisted of asking about contact information, tortoise breed(s), number of tortoise(s), current age, birth weight (if recorded), current weight (if recorded), quantity of feed, diet composition percentage of diet(s), frequency of feeding(s), frequency of veterinarian examination(s), multivitamin supplement brand(s), frequency of multivitamin supplement(s) given, and potential weight change(s).
- Follow up emails were sent typically on a weekly basis between a 4–5-month interval.
- Once the data was collected, a spreadsheet was made to help organize and analyze the data.
- The ingredients of the diets of Desert Tortoise reported from the survey were analyzed to determine their caloric, protein, and vitamin B₁₂ intake.
- Then, the caloric, protein, and vitamin B₁₂ intakes were calculated using percentages of ingredients used and how much their diets weighed to gain more insight on the number of calories, protein, and vitamin B₁₂ the tortoises are consuming based on their food without supplements.
- After the analysis of the composition of the diets, it was determined which tortoises had diets that regularly consisted of vitamin B₁₂ and those that did not.

Results

- From the usable data, there were 9 total Desert Tortoises that had vitamin B₁₂ and 18 Desert Tortoises that did not have vitamin B₁₂ in their diets (Figure 1).
- The supplement with vitamin B₁₂ is fed at different occurrences depending on the organization: 2 organizations feed 3 times a week, 2 organizations feed 7 times a week, and 1 organization feeds 1 time a week (Figure 2).
- 45% of the tortoises had reports of weight changes that were unknown, 33% had no changes in their weights, and 22% had reports that there were weight changes noticed (Figure 3)
- The recorded weight changes were determined to have a weight gain after starting the Desert Tortoises on the supplement with vitamin B₁₂.

Figure 1: Desert Tortoise Organizations Separated by Vitamin B₁₂
Desert Tortoise Organizations

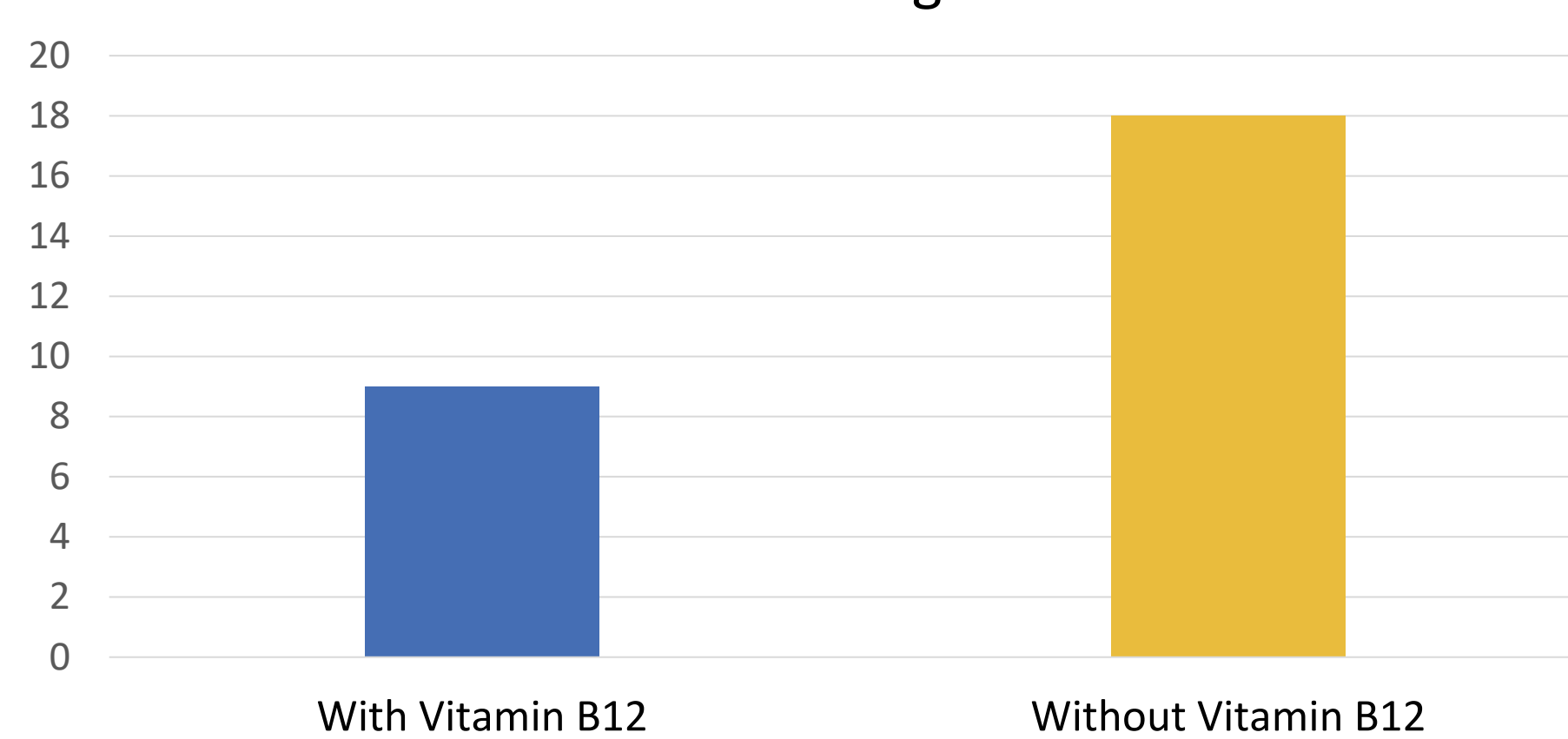


Figure 2: Occurrence of Supplements with Vitamin B₁₂ given per week
Occurrence of Supplement per Week

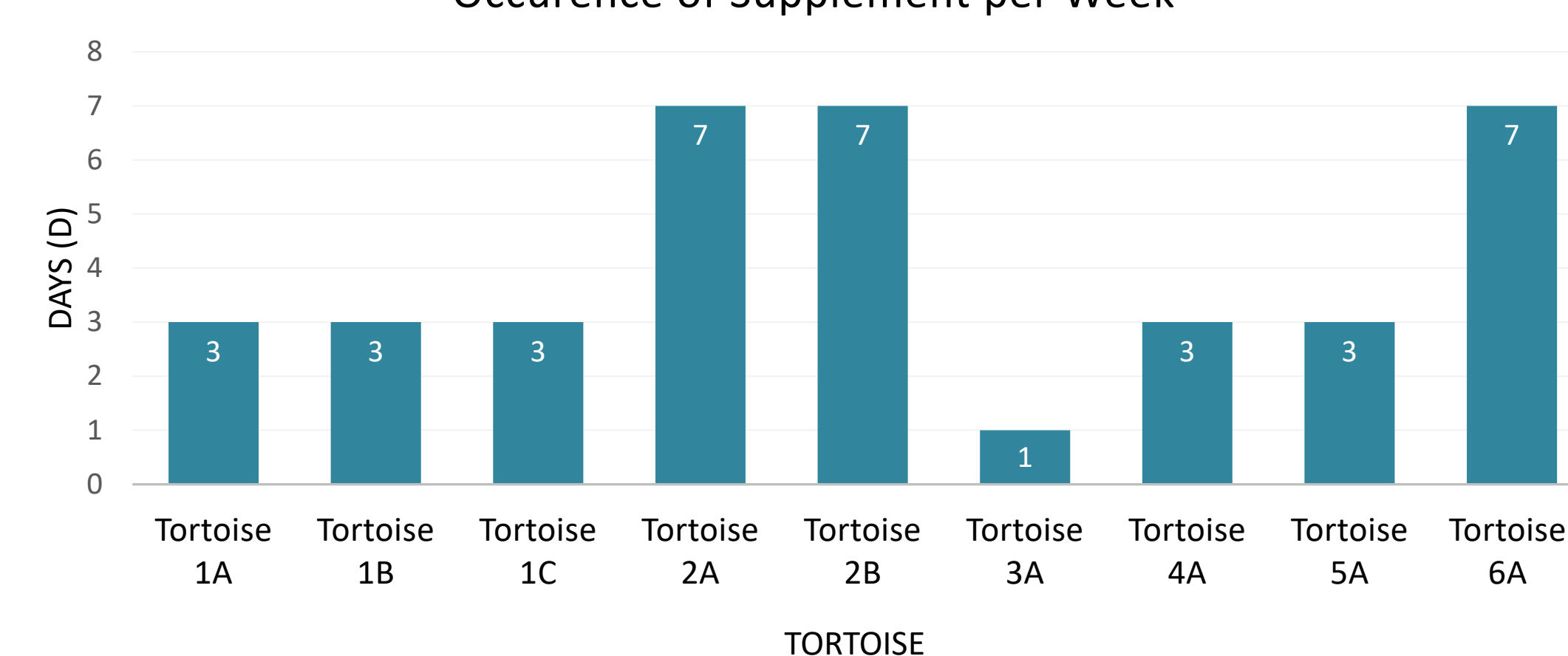


Figure 3: Weight Changes Noticed in Desert Tortoises Since Starting Supplement with Vitamin B₁₂
Weight Changes in Desert Tortoises Since Starting Supplements

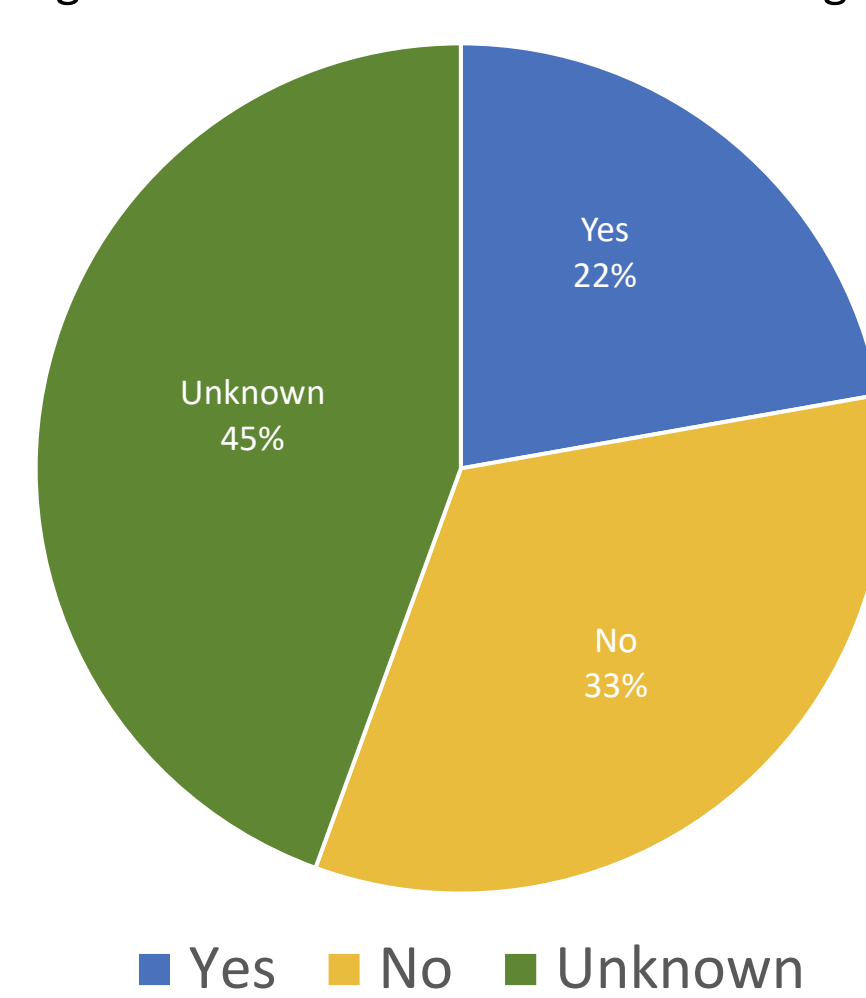


Table 1: Amount of Supplement with Vitamin B₁₂ Given to Individual Tortoises and Record of Weight Changes

Individual Tortoises	Weight Changes	Occurrence of Supplement (per Week)	Amount of Supplement Given
Tortoise 1A	No	3	1/2 tablespoon
Tortoise 1B	Yes	3	1/2 tablespoon
Tortoise 1C	Yes	3	1/2 tablespoon
Tortoise 2A	Unknown	7	Dusted onto Food
Tortoise 2B	Unknown	7	Dusted onto Food
Tortoise 3A	No	1	1/8-1/2 teaspoon
Tortoise 4A	No	3	Dusted onto Food
Tortoise 5A	Unknown	3	1/4 tablespoon
Tortoise 6A	Unknown	7	1/4 tablespoon

Discussion

- After a 5-month period of collecting data, it has been determined that there is no correlation between incorporating vitamin B₁₂ in diets and weight loss on Desert Tortoise weight.
- There is no similar research with this specific topic so there are no results to compare this study to.
- Limited information was provided from the organizations that responded to the computational survey, therefore there could be data that was not given that could have impacted this study.
- If repeated, this experiment would be done with live, obese Desert Tortoises that are given a vitamin B₁₂ supplement in their food and would be weighed on a weekly basis.
- Overall, the hypothesis is rejected, and the null hypothesis is accepted that there is no impact of vitamin B₁₂ on tortoise behavior and weight loss.

Contact Information

David Frausto
California State Polytechnic University, Pomona
dafrausto@cpp.edu
Kellogg Honors College

Acknowledgements

Dr. Hyungchul Han, Ph.D.
Cal Poly Pomona Vivarium and BioTrek Staff
63 Organizations & Private Owners
Kellogg Honors College