

VITAMIN A SUPPLEMENTATION VIA CRICKET DUSTING: THE EFFECTS OF DUSTING FED AND FASTED CRICKETS OF THREE SIZES USING TWO DIFFERENT SUPPLEMENTS ON NUTRIENT CONTENT

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Abstract

This study was undertaken to determine the efficacy in delivering vitamin A supplementation via dusting feed crickets (*Acheta domestica*) to reptiles and amphibians, many of whom have shown vitamin A deficiencies at Disney's Animal Kingdom and other institutions.^{8,10,12} While there have been multiple previous studies regarding supplementation in crickets, the majority have focused on calcium supplementation.^{1,2,4,5,6,7,9,11} Levels of vitamin A in crickets without any supplementation have been found to be minimal.³ Topical treatment of dust supplement on the food source (crickets) is a commonly used practice in zoological institutions to increase calcium and vitamin supplementation. Other options include topical vitamin application to the skin of the amphibian, and gut loading the food source. Due to the ongoing issue of low vitamin A levels in captive amphibians and reptiles, it is important to understand the efficacy of supplemental vitamin A.

Two supplement powders differing only in vitamin A levels / sources were dusted on 3 sizes of crickets. There were four replicates of each treatment for each cricket size. The standard powder had 342,000 IU / kg active Vitamin A, while the test dust had 822,510 IU / kg Vitamin A. The test powder was supplemented with a source of encapsulated straight vitamin A (retinol) not commercially available (Trouw Nutrition International, Highland, IL). Both powders had similar levels of calcium (25%). Fed crickets received a cricket diet for 72 hours prior to their dusting and subsequent death via freezing. Fasted crickets were dusted immediately after their arrival and subsequent freezing death. Both groups of crickets were allowed 15 minutes to groom before being frozen to replicate current husbandry practices.

The results showed different patterns in vitamin A levels depending on cricket size and fed or fasted state, and large variations in quantity of vitamin A retained on the crickets (Figure 1). The highest levels of vitamin A retention were found in fed pinhead crickets with the standard dust. The vitamin A variations may be due to effects from time and accuracy of sieving, temperature variations, the effects of the different sources of vitamin A in the dusts and the cricket's ability to clean themselves in the time between dusting and death. While we did not measure how much dust was lost off the crickets during the 15 minute waiting period, a recent study found that adult crickets were able to clean off over 50% of dust within 2.5 minutes.⁸ This may play a role in our variability. However, the relatively similar calcium levels retained in our crickets indicate each size cleaned themselves at a similar rate (Figure 2). The two powders did not produce significant differences in vitamin A retained within each size group, likely due to large variability in vitamin A concentration within and between groups. Given the potential sources of error, future studies would require a much larger number of replicates necessary to demonstrate true differences in supplementation effects. Preliminary power analysis based on the current study indicated sample

size quantities as high as 80 replicates would be necessary to create significant results. Further investigation is required on the efficacy of delivering vitamin A to reptiles and amphibians via a powdered supplement on feeder crickets.

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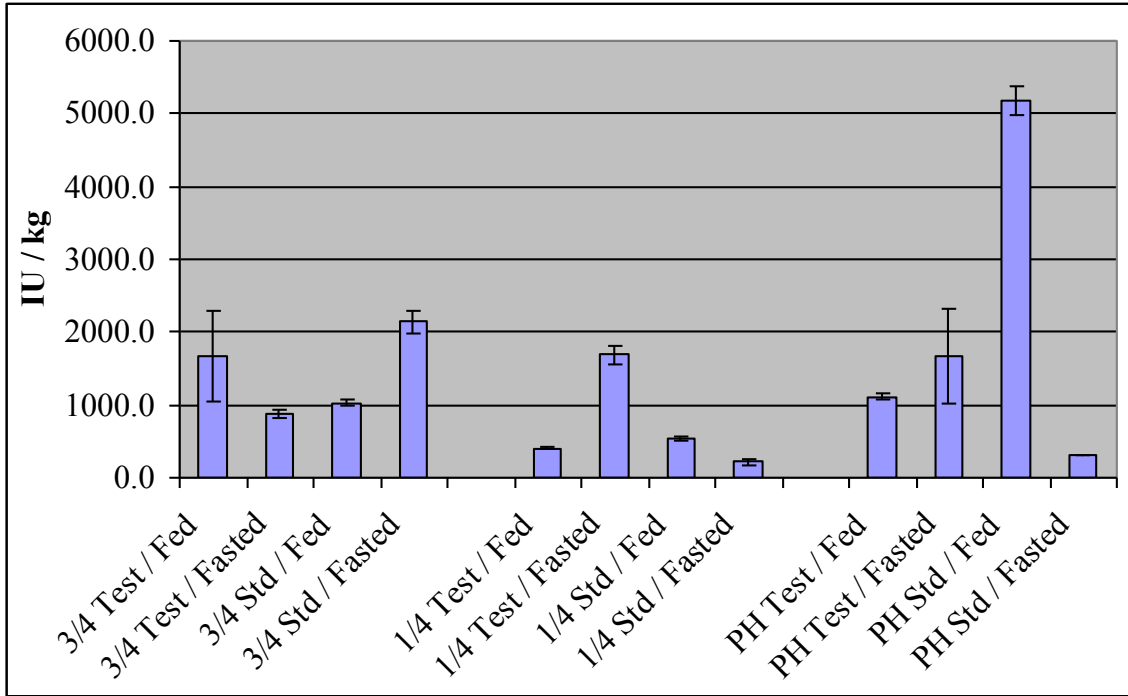


Figure 1. Vitamin A levels (IU / kg) in $\frac{3}{4}$ inch, $\frac{1}{4}$ inch, or pinhead (PH) crickets allowed to feed for 72 hours, or fasted, dusted with one of two powdered vitamin A and calcium supplements (test powder (822,510 IU / kg Vitamin A) or standard powder (342,000 IU / kg Vitamin A))

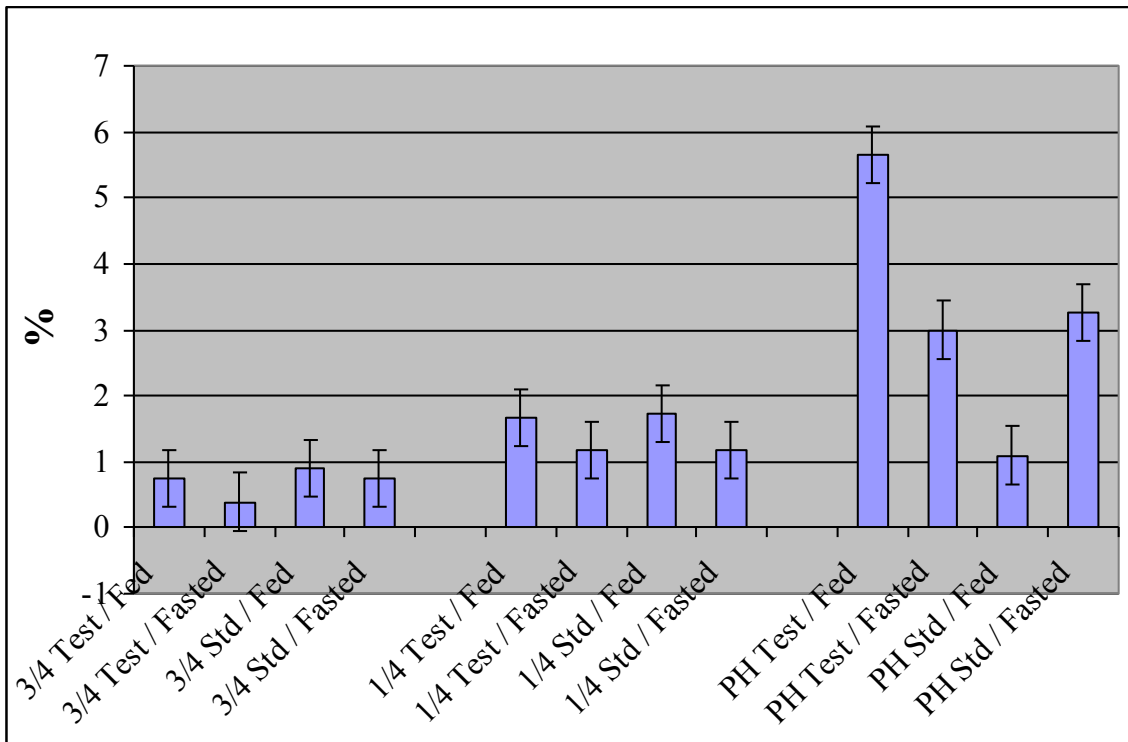


Figure 2. Calcium levels (%) in $\frac{3}{4}$ inch, $\frac{1}{4}$ inch, or pinhead (PH) crickets allowed to feed for 72 hours, or fasted, dusted with one of two powdered vitamin A and calcium supplements (test powder (24.35% Ca) or standard powder (25.25% Ca))