

CALCIUM AND INSECT GUT-LOADING: THE DEVELOPMENT OF A PROTOCOL FOR ACHIEVING THE BEST CA:P RATIO FOR INSECTIVOROUS ANIMALS

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Abstract

Commercially raised insects have inverse calcium to phosphorus ratio. Captive insectivorous animals are potentially at risk for metabolic bone disorders if the calcium to phosphorus ratio is not equalized. This is achieved through an active supplementation program where the feeder insect is given access to a calcium rich diet prior to ingestion by the insectivore. A zoo-wide insect supplementation survey was conducted to evaluate the Brookfield Zoo protocol and found that not only was the protocol less than ideal, but the baseline data required to enable comparisons was absent. In addition, there is very little published information and/or protocols to follow when supplementing feeder insects. Therefore an experiment to determine baseline data and to enable re-evaluation of the protocol was initiated. The experiment was undertaken using 24 identical insect aquaria. Into each of the 24 aquaria, 100 grams of adult crickets (*Acheta domestica*) were placed. After a 24-hour fasting period, a representative sample was taken and the remaining crickets were offered a calcium rich insect diet (Marion™ insect meal). The insect diet was the substrate. Each aquarium was then randomly allocated an experimental period of 2, 4, or 7 days and an aquarium temperature of either 75°F or 85°F, maintained using multiple heat-lamps. External room temperature was maintained at 70°F and water was available to all crickets *ad libitum* using cricket waterers. At the completion of each experimental period the entire aquarium was removed and live insects frozen. Crickets were dried, ground and nutrient analysis performed. On conclusion of this initial experiment, observational evidence showed that at 100 gram stocking density and temperatures above 75°F, survivability was poor. Thus two additional experiments were undertaken using 75 grams of cricket per container and maintaining container temperatures at 75°F. Although results from the initial experiment showed an increase in Ca concentrations within the crickets, achieving the ideal 1:1 Ca:P ratio was difficult. However, results from the two subsequent experiments showed a significant increase in cricket survivability and Ca:P ratios of equal to or above the idea 1:1 ratio. It was concluded that stocking density does have an important role in successful supplementation. Furthermore although most reported studies suggest gut loading for only 2-days to achieve the idea 1:1 ratio, results from this experiment show that after 4-days gut-loading supplementation, Ca:P ratios were maintained and did not decrease until subsequent days.