

CANE TOAD (*RHINELLA MARINA*) VITAMIN A, VITAMIN E, AND CAROTENOID KINETICS

Tarra A. Freel, MS^{1*}, Larry J. Minter, MS, DVM, Dipl. ACZM^{2,3}, Dustin Smith, BA², Elizabeth A. Koutsos, MS, PhD⁴, Troy N. Tollefson, MS, PhD⁵, Frank N. Ridgley, DVM⁶, and Kimberly D. Ange-van Heugten, MS, PhD¹

¹Department of Animal Science, NC State University, 120 W. Broughton Dr, Raleigh, NC 27607, USA.

²Hanes Veterinary Medical Center, North Carolina Zoo, 4401 Zoo Parkway, Asheboro, NC 27205, USA.

³College of Veterinary Medicine, NC State University, 1060 William Moore Dr, Raleigh, NC 27606, USA.

⁴EnviroFlight[®] LLC, 1118 Progress Way, Maysville, KY 41056, USA.

⁵Mazuri[®] Exotic Animal Nutrition, PMI Nutrition International LLC, 4001 Lexington North, Arden Hills, MN 55126, USA.

⁶Conservation and Research Department, Zoo Miami, 12400 SW 152nd St, Miami, FL 33177, USA.

Abstract

Approximately 33% of the total free-ranging amphibian species are threatened. Due to this threat of extinction, the nutrient requirements of all amphibians held within human care are of vital importance. Of these, vitamin A, vitamin E, and carotenoids are of particular interest because of their connection to breeding success and because of the deficiency symptoms that have been described when amphibians are kept under human care. To properly manage amphibian species under human care, management professionals need to know how to adequately care for them nutritionally. Therefore, determining normal circulating concentrations of vitamins A, E, and carotenoids in amphibians is vital so that we can better assess their health status. This research examined the kinetics of vitamin A, vitamin E, and carotenoid concentration changes in the liver and blood of free-ranging cane toads (*Rhinella marina*) as they adjusted to human care while being fed two different diets. The study included 65 adult cane toads (57.8) and took place over a four-month time period with sampling periods at days 22, 50, 81, and 119 days under human care. Diet treatment 1 consisted of Mazuri[®] Hi Calcium Gut Loading Diet fed to feeder brown house crickets (*Acheta domestica*) supplemented with small quantities of fresh sweet potato and carrots. Diet treatment 2 was the same feeder cricket diet except with vitamin A and vitamin E supplementation removed and with no produce supplementation. Results found that there were significant differences ($P < 0.05$) between the free-ranging populations for vitamin A (retinol at $87.7 \pm 16.12 \mu\text{g/g}$), vitamin E (α -tocopherol at $9.2 \pm 0.54 \mu\text{g/g}$), and carotenoids (e.g. β -carotene at $6.1 \pm 1.37 \mu\text{g/g}$) and the toads kept in human care. Concentrations decreased over time in human care for all nutrients, despite dietary supplementation. The novel results from this study imply that additional diet supplementation may be needed for cane toads in order to keep up with their nutrient concentrations from their free-ranging diets. Using the cane toad as a model for these nutrient values can help other amphibian species by providing comparative data.