VITAMIN A AND CAROTENOID METABOLISM: ANALYTICAL CONSIDERATIONS WITH APPLICATION TO ANIMAL NUTRITION

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Abstract

Vitamin A (VA) is an essential nutrient which must be acquired from the diet; either as preformed retinoids from animal origins or provitamin A carotenoids, such as β-carotene, originating from plant materials. Carnivores obtain VA from animal sources and herbivores from plant sources. VA is required for vision, cellular differentiation, growth of bone tissue, embryonic development, and immune function. The term "Vitamin A" is a generic descriptor of retinoids exhibiting some degree of the vitamin A activity of retinol, including retinal and retinoic acid. Carotenoids not only serve as precursors of VA but also provide beautiful coloration for attraction, intimidation, or camouflage.

Due to the diversity of animal metabolism, understanding proper dietary considerations for each species is very challenging. Much of this information is not well documented and relies on the knowledge and observations of animal care takers. Frequently, it is not possible to provide the animal's native diet, so diets are formulated to mimic the foods consumed in the wild. Diet preparation could require analysis of the native diet and formulated diet to determine composition, along with monitoring animal blood or tissue levels of the vitamin or a metabolite. Laboratory testing of dietary and biological content of vitamins, in addition to biological metabolites, is not trivial or commonplace. The animal caretaker is making decisions based upon test results that may influence the health and productivity of the animal.

This presentation will illustrate some metabolic differences between species and discuss the methodology used to measure VA and carotenoids in animals and their diets. Specific attention will be given to precautions needed to obtain good laboratory measurements and interpreting the results.