

- 244 FATTY ACID METABOLISM IN FREE-RANGING AND CAPTIVE RHINOCEROS: EVIDENCE FOR LOW DELTA-6 DESATURASE ACTIVITIES. J.E. Bauer(1) K.E. Bigley(1), E.S. Dierenfeld,(2). 1. Texas A&M University, College of Veterinary Medicine, College Station, TX. USA. 2. Wildlife Conservation Society, Bronx,, NY, USA

Serum triacylglyceride (TG), total phospholipid (PL), and cholesteryl ester (CE) fatty acid (FA) compositions were compared in free-ranging and captive rhinoceros as an index of dietary fatty acid nutrition of the captive animals. Free-ranging animal sera (n=28) were collected from black rhinoceros from four regions of Zimbabwe: Chete, (n=11) Matsudona (n=5), Midlands (n=8), and Hwange (n=4). There were 13 captive animals (11 black and 2 white rhinoceros) from four USA locations. The sera were examined after total lipid extraction and fractionation by thin-layer chromatography, FA methyl ester derivatization, and capillary gas-chromatography. Among the fractions studied, serum TG best reflect dietary fatty acid nutrition in the fed state, PL reflect lipoprotein tissue transport, and CE are an index of FA transferase reactions/reverse cholesterol transport. Also PL-FA are used to calculate the delta-6 desaturase activity index and are useful because this enzyme is regarded as the rate-limiting step in the metabolic conversion of 18 carbon to 20/22 carbon polyunsaturated fatty acids (PUFA). Among the free-ranging animals, serum TG-FA comparisons revealed that more dietary 18:3n-3 was available to animals from the Matsudona and Midlands regions. It was also found that the serum TG linoleic (LA) content of captive animals was 6-fold greater and alpha-linolenic (ALA) content was 3-fold lower than in the free-ranging animals. These findings suggest that current dietary amounts of LA may be too high and amounts of ALA may be too low in captive rhinoceros especially if natural diets are to be mimicked. Serum PL-FA profiles were not different by region but again showed LA enrichment and decreased ALA in captive vs free-ranging samples. Only small relative amounts of long chain PUFA of either the n-6 or n-3 series, (i.e. arachidonic and eicosapentaenoic) were observed in both groups. Using the PL-FA distributions to calculate a delta-6 desaturase index revealed a surprising low value (e.g. 0.3 in rhinoceros vs 0.3 in feline vs 1.4 in canine) suggesting that the activity of this important lipid metabolic enzyme may be comparatively lower in rhinoceros species; similar to felidae. Finally when the CE-FA distributions were examined, it was found that the ALA content similarly differed by region, again with Matsudona and Midlands samples showing the highest enrichment. Also of interest was the finding that the relative distribution of 18 carbon PUFA (LA and ALA) in the CE accounted for more than 60% overall of the fatty acids. This latter finding is also consistent with the observation of low delta-6 desaturase. The resultant high amounts of 18 carbon PUFA seen in PL and CE indicates that they would more readily serve as substrate for cholesterol esterification rather than long chain acids such as arachidonic as in dogs, rats, and humans. While the significance of these observations is presently unknown they may have implications in better understanding the appropriate nutrition of rhinoceros species in captivity.

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