
FATTY ACID COMPOSITION OF WHITE ADIPOSE TISSUE IN CAPTIVE RHINOCEROS

Ellen S. Dierenfeld, PhD, CNS^{1*} and Craig L. Frank, PhD²

¹*Department of Nutrition, Wildlife Conservation Society, Bronx, NY 10460 USA;* ²*Department of Biological Sciences, Fordham University, Bronx, NY 10458 USA*

Abstract

Fatty acid nutrition is intimately tied with general health, immune function, and reproduction in other species, but has not been investigated in detail in the rhinoceros. Limited information on fatty acid composition in native rhinoceros browse is currently available. Data that do exist suggest that native browses contain higher concentrations of alpha-linolenic acid [C18:3(*n*-3)] than linoleic acid [C18:2(*n*-6)], which vary with plant part, species, and season analyzed. In general, ingestion of seeds and kernels favors linoleic acid intake, while ingestion of leaves favors alpha-linolenic acid. Diets fed to captive rhinoceros are heavily dominated by grains (in pelleted feeds) and dried forages compared with fresh browses, which may affect fatty acid status.

We assayed fatty acids in rhinoceros white adipose tissue samples (*n* = 8) that were obtained at necropsy and stored frozen (-70°C) by gas chromatography using standard analytic techniques. Results of this analysis are detailed in Table 1.

Typically, animals feeding on diets with appropriate levels of C18:2 have depot fats containing $\geq 5\%$ linoleic acid. Five of eight samples analyzed contained linoleic acid concentrations below that threshold, indicating possible linoleic acid-deficient diets. All the low-linoleic acid samples were obtained from browsing rhinoceros species (Sumatran rhino, *Dicerorhinus sumatrensis*, *n* = 1; black rhino, *Diceros bicornis*, *n* = 4). Further, only two of the rhino white adipose tissue samples contained detectable alpha-linolenic acid (C18:3) concentrations, another essential fatty acid found in natural browses.

These preliminary data indicate that fatty acid nutrition of rhinoceros needs to be evaluated in much greater detail. Captive diets of browsing rhino species should be analyzed (and possibly supplemented) to ensure adequate levels of both essential fatty acids, in proper proportions.

ACKNOWLEDGMENTS

Funding for this study was supplied by the International Rhino Foundation. Adipose tissue samples came from the Rhinoceros TAG frozen tissue bank maintained by the St. Louis Zoological Park.

Table 1. Fatty acid concentrations in rhinoceros white adipose tissue (expressed as a % of total fatty acids), obtained from captive animals at necropsy.

Species	n	C14:0	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3	C20:1
<i>Dicerorhinus sumatrensis</i>	1	1.1	32.2	6.9	3.6	54.7	1.6		
<i>Diceros bicornis</i>	6	1.5 ± 1.4	28.3 ± 5.2	4.6 ± 1.8	6.8 ± 1.8	44.0 ± 8.6	9.6 ± 7.4	1.4 ± 0.6	1.7 ± 1.3
								<i>n</i> = 2	<i>n</i> = 2
<i>Rhinoceros unicornis</i>	1		29.7		8.9	61.4			