

THE INTERACTION OF DIET AND FECAL CORTISOL IN THE SOUTHERN WHITE RHINOCEROS (*CERATOTHERIUM SIMUM SIMUM*)

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Abstract

Adverse physiological effects due to external and internal stimuli, such as diet, metabolism and environment, may contribute to the low captive reproductive success rate of the Southern White Rhinoceros (*Ceratotherium simum simum*). The objective of this study was to examine fecal cortisol response in the Southern White Rhinoceros population at the North Carolina Asheboro Zoo while consuming four different pelleted feeds. Seven mature Southern White Rhinoceroses, ages ranging from 10-45 years old, were divided into these four different diet groups based on compatibility and rotated through a 4x4 double Latin square design (four repeated periods to total eight 21-d feeding periods). The commercial pelleted complete feeds varied in starch (3.4-24.0%), fiber (11.0-27.0%), protein (13.0-17.0%), and fat (3.0-3.9%) content. The rhinoceros population also received a bale of timothy hay, 15.9 kg/herd, each day and ad libitum access to pasture bermudagrass and water during the study period. Fecal samples were collected directly from the rectum between 8:00-10:00 am on Monday or Tuesday of each week. The range of mean \pm SD for cortisol among individuals was found to be 5.0 ± 3.45 ng/g, DM to 17.0 ± 4.04 ng/g, DM. Fecal cortisol concentration levels showed a strong inter-individual response to each of the four pelleted complete feed ($P < 0.05$), but there was no correlation between the type of pelleted complete feed and fecal cortisol levels. Thus, cortisol response should potentially be evaluated on an individual basis rather than by population. Fecal cortisol measurements ($n = 227$) compose the longest (days = 238) and most numerous collection of such data from the captive Southern White rhinoceros species to date.