EXOGENOUS INFLUENCES ON SERUM TESTOSTERONE CONCENTRATION IN CAPTIVE BLACK RHINOCEROS (*Diceros bicornis*)

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Abstract

While captive breeding of rhinoceros species has met with some success, difficulties are encountered. Different rhinoceros species in the wild show varying sociosexual behaviors. Indian (*Rhinoceros unicornis*) and black rhinoceros (*Diceros bicornis*) tend to remain solitary except during the breeding season or when concentrating around resources. White rhinoceros (*Ceratotherium simum*) are more gregarious. Captive management strategies attempt to mimic these natural relationships as much as possible, but no study has evaluated the effect of captive sociosexual environment on hormonal concentrations. Testosterone, for example, is essential for spermatogenesis, development of primary and secondary sexual characteristics, and libido, all of which play key roles in fertility. This study investigates reproductive hormones in rhinoceros species in different sociosexual settings to determine the importance of social groupings on fertility. Our overall hypothesis is that reproductive hormone concentrations in male rhinoceros reflect reproductive performance and can be used to assess potential reproductive success. Our specific hypothesis for this study is that serum hormones related to reproduction in male rhinoceros will show variation with age, time of year, and sociosexual status.

Questionnaires and requests for serum samples were sent to 72 AZA institutions in the United States and responses were received from 63 institutions. As of January 2004, 442 samples had been received from collaborating institutions. To date, samples have been analyzed for testosterone using enzyme immunoassays (EIAs) already validated for these species. Preliminary data collected from 382 black rhinoceros serum samples show a significant difference between testosterone concentrations in juvenile and adult samples ($P < 0.05$). These data do not show a correlation between time of year and testosterone concentration. Preliminary findings show that individual black rhinoceros males may experience a change in testosterone concentration if sociosexual status changes. One male housed with a single female rhinoceros, for example, showed a significant rise in testosterone concentration when a second female was introduced ($P < 0.05$). In addition, individual males showed higher numeric concentrations when housed with females than when housed separated by a barrier or isolated completely. Further study is indicated to verify these relationships in black rhinoceros and evaluate their influence on white and Indian rhinoceros.