CORTICOID CONCENTRATIONS ARE A MISLEADING METRIC OF ANIMAL WELFARE DURING MANAGEMENT: TESTS DURING THE TRANSLOCATION OF AFRICAN RHINOCEROS

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ABSTRACT:

Concentrations of adrenal steroid metabolites in feces are routinely used to assess the welfare of animals that are the subject of conservation efforts. The assumption that low and declining corticoid concentrations indicate the absence of stress and acclimation, respectively, is often made without experimental support or wild-animal comparisons, although intrinsic control of adrenal steroids might occur even under ongoing stress and distress. We adopted the capture and 11 week captivity of 18 black (*Diceros bicornis*: 11 male, 7 female) and 52 white (*Ceratotherium simum*: 22 male, 30 female) rhinoceros as an experimental test of the relationship between corticoid concentrations and stress (translocation) and measured for suppressed gonad function as an indicator of distress – the biological cost of cumulative stressors. Fecal samples collected from the rectum at capture and during captivity were stored frozen and their corticoid, and androgen (in males) or progestin (in females), concentrations determined by radioimmunoassay. Corticoid profiles followed the expected pattern of being 2-5 times pre-capture levels ($ng.g^{-1}$: black rhino: female, 24.5±3.7, male 23.9±2.2; white rhino: female 16.3±1.6, male 12.3±2.4) for up to 17 days after capture and declined with time in captivity. Black rhinoceros and male white rhinoceros corticoids declined below pre-capture values and were associated with suppressed levels of androgens and progestins with increased time in captivity. Declining corticoids could not be interpreted as acclimation or the absence of stressors, without also measuring for distress in African rhinoceros. White rhinoceros female corticoid values remained elevated, although their gonad steroid levels were also suppressed. We discuss our findings for the management of rhinoceros in the wild and captivity.

Notes