The Old School, Brewhouse Hill, Wheathampstead,
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www.ufaw.org.uk

Animal Welfare 2013, 22: 467-472
ISSN 0962-7286
doi: 10.7120/09627286.22.4.467

*Seasonal pattern of salivary cortisol secretion in the greater one-horned rhino (*Rhinoceros unicornis*)*

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Abstract

*The Indian rhinoceros or greater one-horned rhino (*Rhinoceros unicornis*) is listed as vulnerable by the IUCN Red List of Threatened Species and, therefore, captive individuals have been subject to the European Endangered Species Programme since 1990. Enhancement of welfare is key in ensuring the breeding success of this species in captivity. Salivary cortisol has been recently used to assess welfare of captive and free-ranging animals. Nevertheless, rhythms of cortisol secretion may fluctuate throughout the year and therefore, knowledge of the circannual pattern of cortisol secretion is essential to evaluate the physiological significance of seasonal variations of cortisol levels as an indicator of stress in animals. Here, we analyse monthly differences in cortisol secretion in two Indian rhinoceros. Saliva samples of two rhinoceros were collected and analysed by radioimmunoassay for the period of one year to determine cortisol concentrations. We found a seasonal pattern of salivary cortisol secretion. The highest cortisol concentrations were found in August and decreased until reaching a nadir in January. Cortisol concentrations in these two animals showed a correlation with temperature and visitor numbers but it is not possible to draw conclusions from this study as to whether the variation in cortisol was due to these or other factors.*

Keywords: *animal welfare, Indian rhinoceros, salivary cortisol, seasonality, stress, zoo visitors*