# Invasive and non-invasive methods of hormone monitoring in captive wildlife

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Common reasons for monitoring hormone concentrations in animals, domestic or wild, include breeding management, pregnancy diagnosis, stress assessment, and to diagnose endocrine illness. Before any of these practical tools can be utilized, however, they must first be developed through basic research to determine normal cyclicity and factors, both external and internal, affecting the hormones in question. Whether collecting samples for research, medical, or management purposes, invasive and non-invasive methods of sample collecting are commonly utilized.

The invasive method of monitoring the endocrine system is to collect blood through venipuncture in order to measure hormone concentrations directly in the serum or plasma. The non-invasive methods involve the collection of feces, urine, or even saliva in order to measure metabolites of the hormones of interest. Samples obtained from either method are most often analyzed with radioimmunoassay (RIA) or enzyme immunoassay (EIA) technology. Both collection and assay methods have advantages and disadvantages. Choice of method depends on the tractability of the species or individual animal in question and the type of question the data is expected to answer.

We are researching basic questions surrounding male rhinoceros reproductive endocrinology. Understanding rhinoceros reproductive physiology will help us better address reproductive challenges in both captive and free-ranging populations. Workers have studied various aspects of female rhinoceros reproductive physiology. Until recently, however, there has been a paucity of information relating to the reproductive physiology of male rhinoceros.

We are measuring serum testosterone concentrations in captive male white, black, and Indian rhinoceros and investigating the influences of season, age, and female presence. To date, our laboratory has received monthly serum samples from 35 white, 31 black, and 7 Indian rhinoceros. Preliminary data show that testosterone concentrations rise during the first eight years of life, and then no longer show a correlation with age in black rhinoceros. Season does not seem to have an effect on serum testosterone concentrations in captive black rhinoceros. The presence of more than one female, or the addition of a new female, seems to stimulate testosterone production in male black and white rhinoceros.

These data suggest that captive, male, black rhinoceros in North America do not show a fluctuation in their serum testosterone concentration correlated with time of year. They appear to undergo hormonal puberty around the age of 6 years. This correlates well with anecdotal evidence of when young male rhinoceros start breeding in captivity. These data also suggest that sociosexual environment may play a role in serum testosterone concentration in captivity. Further studies are indicated to confirm this.