

**PREGNANCY DIAGNOSIS IN SOUTHERN WHITE RHINOCEROS (*Ceratotherium simum simum*) BY COMMERCIAL SERUM HORMONE ANALYSIS OvuCHECK® PREMATE 10**

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**Abstract**

Pregnancy diagnosis and monitoring of threatened southern white rhinoceros (*Ceratotherium simum simum*) (SWR) populations in human care can be challenging for conservation facilities. Progesterone concentrations in feces is reliable and non-invasive, but communal dung piles and large herd numbers can make collecting individual fecal samples difficult.<sup>1,2,7</sup> Blood sampling for serum progesterone quantification in individuals is an alternative, but facilities face long processing times at commercial laboratories.<sup>3,4</sup> This study evaluated if a patient-side serum progesterone test could be used for pregnancy detection in SWR populations. The female rhinoceroses at The Wilds were conditioned to participate in voluntary blood collection. Whole blood was collected from eight females, spun, serum separated and frozen (-20 °C) until analysis. A commercially available patient side semi-quantitative ELISA test<sup>5</sup> was performed in-house to measure progesterone in 31 thawed serum samples. Total time needed to process the samples in-house, post thawing, was 30 min. Results were placed into three categories: low (< 3 ng/ml), intermediate (3-9.9 ng/ml) and high (≥ 10 ng/ml) concentrations of progesterone.<sup>5,8</sup> For validation, paired frozen serum samples were processed at Omaha's Henry Doorly Zoo's Endocrinology Lab for progesterone concentration quantification via enzyme immunoassay (EIA), using an anti-progesterone antiserum (CL425).<sup>6</sup> When compared to EIA, OvuCHECK® Premate 10 had a sensitivity and specificity of 83.3-100% and 90-100%, and positive and negative predictive values of 84.6-100% and 88.9-100%, respectively. Overall accuracy of the commercial test was measured to be 93.5%. This method rapidly and accurately measures progesterone concentrations in individual SWR.

<sup>5</sup>OvuCHECK® Premate 10, Zoetis, St Marys, WV 26170 USA.

**Key words:** *Ceratotherium simum simum*, OvuCHECK® Premate 10, pregnancy diagnosis, serum progesterone, southern white rhinoceros

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#### LITERATURE CITED

1. Berkeley EV, Kirkpatrick JF, Schaffer NE, Bryant WM, Threlfall WR. Serum and fecal steroid analysis of ovulation, pregnancy, and parturition in the black rhinoceros (*Diceros bicornis*). *Zoo Biol.* 1997;16:121-132.
2. Carlstead K, Brown JL. Relationships between patterns of fecal corticoid excretion and behavior, reproduction, and environmental factors in captive black (*Diceros bicornis*) and white (*Ceratotherium simum*) rhinoceros. *Zoo Biol.* 2005;24:215-232.
3. Hermes R, Goritz F, Saragusty J, Molnar V, Reid CE, Schwarzenberger F, Hildebrandt TB. First successful artificial insemination with frozen-thawed semen in rhinoceros. *Theriogenology.* 2009;71:393-399.
4. Hildebrandt TB, Hermes R, Walzer C, Sos E, Molnar V, Mezosi L, Schnorrenberg A, Silinski S, Streich J, Schwarzenberger F, Goritz F. Artificial insemination in the anoestrous and the postpartum white rhinoceros using GnRH analogue to induce ovulation. *Theriogenology.* 2007;67:1473-1484.
5. Moxon R, Copley D, England GW. Technical and financial evaluation of assay for progesterone in canine practice in the UK. *Vet Rec.* 2010;167:528-531.
6. Munro CJ, Lasley BL. Non-radiometric methods for immunoassay of steroid hormone. *Prog Clin Biol Res.* 1988;285:289-329.
7. Patton ML, Swaisgood RR, Czekala NM, White AM, Fetter GA, Montagne JP, Rieches RG, Lance VA. Reproductive cycle length and pregnancy in the southern white rhinoceros (*Ceratotherium simum simum*) as determined by fecal pregnane analysis and observations of mating behavior. *Zoo Biol.* 1999;18:111-127.
8. Suryanarayanan, Sridevi P, Kirubakaran J, Veerapandian C, Raj GD. Development of a semi quantitative progesterone enzyme immunoassay for determination of ovulation times in bitches. *Inter J Vet Sci.* 2012;1:89-92.