FAECAL STEROID ANALYSIS IN FREE-RANGING WHITE RHINOCEROSES (*Ceratotherium simum)* ON A GAME RANCH IN NAMIBIA

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Extended abstract

The reproductive problems of captive male and female white rhinoceroses were summarised at recent wildlife conferences (2, 4, 5). Approximately 60% of female captive white rhinoceroses are a-cyclic (6). The reasons are 1) females with no luteal activity (true flatliners) and 2) females with persistent luteal activity. Females from the last group are nulli-parous, usually over 12 years of age and their uterus is affected by severe pathologies (cysts) resulting in infertility. In contrast, cysts are usually not present in primi- or multi-parous females (2, 4). Male infertility in captive white rhinoceroses is a severe additional problem and cause for the low reproductive rate. Our results imply that more than 2 males in the same institution can suppress each other's fertility (1).

The objectives of this study were to determine whether reproductive problems are present in wild populations. Study site was Otjiwa game ranch (size: 100 km²), Namibia. The number of rhinoceroses on this farm varied between 21 and 26 animals during the past 3 years. The herd consists of about 8 breeding females with their offspring, and 1 – 2 bulls of breeding age. Until recently only one dominant bull was kept on the farm. Severe fighting between this dominant bull and the younger bulls made removal of bulls over the age of 4-5 y necessary. Currently 2 bulls of breeding age are kept at the farm and sample collection from these bulls is in progress in order to elucidate to what extend their territorial status is reflected in faecal androgen concentrations.

All females of breeding age on Otjiwa game ranch are usually with calves and age at first calving was around 7.5 years. Calving intervals of about 2.5 years indicate that infertility conditions, comparable to captive white rhinoceroses in the EEP or SSP, are not present. In order to monitor oestrous cyclicity in this semi-wild population, fresh dung samples from the females were serially collected after tracking by game scouts over the past 3 years. Samples were stored in methanol and lyophilised prior to analysis with an established 20-oxo-pregnane assay (6). Average individual sample collection interval was about 20 d (range 1-100 d). This long interval and the fact that females seem to become pregnant after a short period of lactational an-oestrus hindered statements on cyclicity. However, pregnancy diagnosis, even from single samples was 100% accurate after Day 120.

The major problem in our study is the identification of collected samples, as farm size and brush coverage made tracking difficult. Profiles of faecal progesterone metabolite concentrations from

pregnant animals indicate that the game scouts misidentified about 20-25 % of samples. As ear notches and radio transmitters are currently not available with our study animals, a digital spoor identification technique is presently under investigation (3). This non-invasive technique was recently developed for identifying individual black rhino from their footprints (spoor) and is being adapted for the identification of the white rhinoceroses on Otjiwa game ranch. For spoor identification, digital images were taken of the hind spoors from tracks, and landmark points were manually placed on the spoor image. From these digital images, measurements (lengths and angles) were generated using customised software (3). The limitation of this technique is the difficulty of the practical applications by the African game scouts, who have no experience in using computers. In addition, the quality of the spoor images varies with dry or rainy season. In summary, use of faecal steroid analysis in a semi-wild white rhinoceros population is hampered by difficulties in the identification of collected samples. Therefore we are currently investigating whether sample identification can be improved by applying a digital spoor identification technique.

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References

1. Hermes R, Hildebrandt TB, Blottner S, Walzer C, Silinski S, Patton ML, Durrant B, Schwarzenberger F and Göritz F. Reproductive state of captive southern and northern white rhinoceros (*Ceratotherium simum simum, C.s. cottoni*): Evaluation of male genital tract morphology and semen quality before and after cryopreservation. Theriogenology 2004; *submitted.*
2. Hermes R, Walzer C, Schwarzenberger F, Göritz F, Patton ML, Tomasova K and Hildebrandt TB. GnRH agonist implants for ovarian down regulation and ovulation induction in rhinoceroses. Verhber Erkrg Zootiere 2003; 41: 305-308.
3. Jewell ZC, Alibhai SK and Law PR. Censusing and monitoring black rhino (*Diceros bicornis*) using an objective spoor (footprint) identifcation technique. J Zool Lond 2001; 254: 1-16.
4. Schwarzenberger F, Walzer C, Silinski S, Tomasova K, Göritz F, Hildebrandt T and Hermes R. Problems associated with the low reproductive rate in captive white rhinoceroses (*Cerathoterium simum*): an update. Verhber Erkrg Zootiere 2003; 41: 301-303.
5. Schwarzenberger F, Walzer C, Tomasova K, Göritz F, Hildebrandt T and Hermes R. An IRF/SOS Rhino sponsored integrated approach for the enhancement of reproductive performance of white rhinoceroses in the EEP. In: Schwammer HM, Foose TJ, Fouraker M and Olson D (eds). A Research Update on Elephants and Rhinos, Proceedings of the International Elephant and Rhino Research Symposium, Vienna. Schüling Verlag, Münster, Germany 2001; 219-221.
6. Schwarzenberger F, Walzer C, Tomasova K, Vahala J, Meister J, Goodrowe KL, Zima J, Strauß G and Lynch M. Faecal progesterone metabolite analysis for non-invasive monitoring of reproductive function in the white rhinoceros (*Ceratotherium simum*). Anim Reprod Sci 1998; 53: 173-190.