

**SUPPLEMENT**

**wtm**

**Veterinary Medicine Austria**  
**Wiener Tierärztliche Monatsschrift**



[www.oegt.at](http://www.oegt.at)



Proceedings of the Conference on

“Non-invasive Monitoring of Hormones”

(3<sup>rd</sup> annual ISWE meeting)

Vetmeduni Vienna, Austria

September 23<sup>rd</sup> to 26<sup>th</sup> 2012

**vetmeduni**  
**vienna** 

**Edited by:**

Rettenbacher, S.,

Vick, M. and Palme, R.

acids) and peanut groups. In summary the results show the most positive effects on cognition and reduced cortisol concentrations in the peanut group. This seems to be in contrast to former studies, where nutrients high in n-3 fatty acids had positive behavioural and physiological effects, but not n-6 fatty acid rich diets.

## PR1

### Faecal progestagen patterns in wild African white rhinoceros (*Ceratotherium simum*)

van der Goot, A. C.<sup>1,2,4</sup>, Dalerum F.<sup>2,3</sup>, Ganswindt A.<sup>2,4</sup>, Martin G. B.<sup>1</sup>, Millar R. P.<sup>2,5</sup>, Paris M. C. J.<sup>1,5</sup>

<sup>1</sup>School of Animal Biology, University of Western Australia, Crawley, Western Australia, Australia, <sup>2</sup>Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa, <sup>3</sup>Centre for Wildlife Management, Hatfield Experimental Farm, University of Pretoria, Pretoria, South Africa, <sup>4</sup>Department of Production Animal Studies, Faculty of Veterinary Science, University of Pretoria, South Africa, <sup>5</sup>Institute for Breeding Rare and Endangered African Mammals (IBREAM), Edinburgh, Scotland, UK, e-mail: [annemieke@ibream.org](mailto:annemieke@ibream.org)

The white rhinoceros (*Ceratotherium simum*) was rescued from extinction in southern Africa at the end of the 19<sup>th</sup> century but is still currently listed as ‘near threatened’ by the IUCN, primarily due to poaching. Captive breeding is a realistic option for long-term survival of the species but, to date, success has been poor. Knowledge of the reproductive status of wild animals can provide valuable information for the development of appropriate management plans. The present study aimed to establish a non-invasive protocol for monitoring faecal progestagen patterns in wild female southern white rhinoceroses. Six adult females at Lapalala Wilderness Reserve, South Africa, were located at least once every week. Three of these six animals gave birth during the study period. Faecal samples were collected at weekly intervals for 12 months (Oct 2008-Nov 2009). Samples were collected fresh and stored frozen at -20°C until analysis. They were lyophilized and approximately 0.05 g of each powdered faecal sample was extracted with 80% ethanol water (3 ml). Faecal extracts were assayed using an enzyme immunoassay for 5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one (polyclonal antibody against 5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one-3-HS-BSA and

5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one-3-HS-peroxidase label). Mean faecal pregnane concentrations in each of the three pregnant females were 35 to 64-fold higher during pregnancy (55-145 days before parturition) than postpartum. The remaining three animals had mean faecal pregnane concentrations comparable to postpartum values. Our results show that non-invasive faecal progestagen measurements can provide information on the reproductive status of wild female white rhinoceroses, and be used for the detection of pregnancy in wild individuals. Collectively, the data clearly underlines the value of non-invasive hormone measurements as a tool to provide information on the reproductive patterns of free-ranging white rhinoceroses, thereby opening new opportunities to optimize breeding efforts of white rhinoceros populations in especially small and medium sized game reserves.

## PR2

### Reproductive steroid monitoring in white rhinoceroses kept in European zoos

Schwarzenberger F.<sup>1</sup>, Walzer C.<sup>2</sup>, Versteeg L.<sup>3</sup>, Goeritz F.<sup>4</sup>, Hildebrandt T. B.<sup>4</sup>, Hermes R.<sup>4</sup>

<sup>1</sup>Department of Biomedical Sciences/Biochemistry, University of Veterinary Medicine Vienna, Austria <sup>2</sup>Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna, Austria <sup>3</sup>Safaripark Beekse Bergen, Hilvarenbeek, The Netherlands <sup>4</sup>Leibniz Institute for Zoo & Wildlife Research, Berlin, Germany,

e-mail: [Franz.Schwarzenberger@vetmeduni.ac.at](mailto:Franz.Schwarzenberger@vetmeduni.ac.at)

White rhinoceroses within the EEP are not self-sustaining, as only 20% breed successfully. A comprehensive analysis of this worrying situation was summarized in the 2009 and 2011 in the European White Rhinoceros Studbook. Over the past two decades, faecal steroid hormone analysis in female white rhinoceroses, sometimes accomplished by rectal ultrasonographic examinations, has been used to investigate reproduction and reproductive problems. The ‘normal’ oestrous cycle is about 35 days in length, however cycles of 70 days in length, as well as missing ovarian activity (‘flatliners’), or persistent luteal activity are common observations. Conceptions were observed following oestrous cycles of 35 days. Recently several young rhino cows were imported from South Africa into the EEP. Reaching puberty between 4-6 years of age; oestrous cycles in these young cows usually are 35

days in length. All efforts should be undertaken to successfully breed female white rhinos before age 10 y. Otherwise ovarian activity is prone to the development of persistent luteal activity, paving the way to ovarian and uterine pathologies. In some young cows ovarian activity diminish to flatliner status. The distribution of births in the EEP indicates reproductive seasonality in some cows, which correlates with missing luteal activity during winter months. The EEP recommendation is to keep white rhinos in groups of 1 male and 2-4 females. However this does not guarantee successful breeding. Therefore, in order to stimulate breeding in non-reproducing white rhinos, changing group composition is recommended. Suggestions include transfer of males or females between groups, or to separate, yet to unify males with his herd of females after a few months of separation. Future endocrine monitoring will study effects of varying group size on reproductive parameters, or the influence of a white rhino cow on the reproductive endocrinology of its calf. The ultimate goal is to improve breeding success in captive white rhinoceroses.

### PR3

#### Using hormone analysis to investigate reproductive success in the female eastern black rhinoceros (*Diceros bicornis michaeli*)

Edwards K. L.<sup>1,2</sup>, Shultz S.<sup>3</sup>, Pilgrim M.<sup>1</sup>, Walker S. L.<sup>1</sup>

<sup>1</sup>North of England Zoological Society, Chester Zoo, Caughall Road, Upton-by-Chester, UK <sup>2</sup>Institute of Integrative Biology, University of Liverpool, Crown Street, Liverpool, UK <sup>3</sup>Faculty of Life Sciences, University of Manchester, Oxford Road, Manchester, UK  
e-mail: [k.edwards@chesterzoo.org](mailto:k.edwards@chesterzoo.org)

With fewer than 750 eastern black rhinoceros left in the wild, ex situ populations play a vital role in the conservation of this species. However, for captive populations to fulfill their role, they must be self-sustaining. Over the last decade, the European captive population has been relatively stable, but low rates of reproduction are limiting growth. On average, only 11% of mature females reproduce each year and 41% of reproductive age individuals in the current population are yet to successfully produce offspring.

In an attempt to improve population performance, this study was initiated to investigate why

individuals may be failing to reproduce. Reproductive monitoring was carried out on 89% of the population (n=24 males, 39 females), using progesterone (CL425, UC Davis), oestradiol (R4972, UC Davis), testosterone (R156/7, UC Davis) and corticosterone (CJM006, UC Davis) enzyme immunoassays to investigate differences in reproductive success.

Reproductive cycles were observed in 94% of mature females, and normal cycles ranged from 20-40 days in length. However, irregular cycles were also common, with a high incidence of long (41-179 days) and short (10-19 days) cycles, and periods of acyclicity also seen. Periods of regular and irregular cyclicity were observed in both parous and nulliparous females; and individuals often exhibited both over a 12-month sampling period.

Average faecal glucocorticoid concentration (fGC) did not differ between parous and nulliparous females, so differences in fGC between regular and irregular periods of cyclicity were investigated within individuals. Faecal glucocorticoid metabolites were higher during irregular cycles and during long cycles, compared to both short and normal length cycles and to anoestrus periods.

A better understanding of reproductive function and factors that could affect reproductive success could improve population performance by increasing both reproductive output and the proportion of females that contribute to future breeding success.

### PR4

#### Relationship between management, adrenal activity and reproduction in a captive group of female Asian elephants (*Elephas maximus*)

Trotter J.<sup>1,2</sup>, Edwards K. L.<sup>1</sup>, Jones M.<sup>2</sup>, Steinmetz H. W.<sup>1</sup>, Walker S. L.<sup>1</sup>

<sup>1</sup>North of England Zoological Society, Chester Zoo, Upton-by-Chester, UK <sup>2</sup>Manchester Metropolitan University, John Dalton Building, Manchester, UK,  
e-mail: [j.trotter@chesterzoo.org](mailto:j.trotter@chesterzoo.org)

Asian elephants in captivity can be prone to reproductive problems including acyclicity and asymmetric reproductive ageing. To maintain healthy and sustainable herds in captivity, a better understanding of potential influences on reproductive cyclicity are warranted. Routine reproductive monitoring carried out on a herd of five reproductive age females revealed that oestrus cycles were