

## Comparison of The Antiphospholipid Syndrome to Medical Syndromes of Captive Black Rhinos (*Diceros bicornis*)

Ray L. Ball, DVM and Matthew Morrow, MS, MT (ASCP),  
Busch Gardens Tampa Bay, 3605 Bougainvillea Drive, Tampa, Fl 33674 USA;  
Warren Magnuson Clinical Center, National Institutes of Health, Bethesda, MD USA

Black rhinos in captivity have been plagued by a host of clinical entities. These include superficial necrolytic dermatitis (SND), hemosiderosis, hemolytic and non-hemolytic anemias, and most recently the idiopathic hemorrhagic vasculopathy syndrome (IHVS) has been described in a group of black rhinos. Other conditions affecting black rhinos include encephalomalacia<sup>10</sup> and necrotic laminar disease. Infectious conditions ranging from *Salmonella*, *Aspergillus* pneumonia, and leptospirosis have all been documented. Recurrent embryonic/fetal loss has been seen in one female by the author and in captive Sumatran rhinos (T. Roth, pers.comm.). The antiphospholipid syndrome (APS) is defined as the occurrence of venous and arterial thrombosis, recurrent fetal losses, and frequently a moderate thrombocytopenia in the presence of the phospholipid antibodies (aPL), namely lupus anticoagulant (aLA), anticardiolipin antibodies (aCL), or both. The pathogenesis of APS is quite simply thrombosis regardless of the organ system involved.

Comparisons between APS and black rhino syndromes may not be obvious at first but there may be some parallels (Table 1). Other manifestations and criteria that constitute APS in rhinos have been seen sporadically. Thrombocytopenia is a hallmark of the condition. Coagulation profiles and the development of black rhinoceros specific ELISA for APS related antibodies will be described.

Table 1. Comparisons within organ systems between APS and black rhino syndromes

System	APS	Black Rhino Syndrome
Skin/Digits	Cutaneous necrosis, livedo reticularis	Superficial necrolytic dermatitis, laminar necrosis, IVHS
Pulmonary	Pulmonary embolism	IVHS, hemosiderosis
Cardiovascular	Valvular lesions	Valvular hemosiderosis
Reproductive	Embryonic/fetal loss	Embryonic/fetal loss
Neurological	Cerebral ischemia	Encephalomalacia

## Multiple Isoflurane Anesthesia in a Captive Black Rhinoceros (*Diceros bicornis*).

Ray L. Ball, DVM, David Murphy, DVM, John H Olsen, DVM, Mike Burton, VMD,  
Genevieve Dumonceux, DVM,  
Busch Gardens Tampa Bay, 3605 Bougainvillea Drive, Tampa, Fl, 33674; Lowry Park  
Zoo, 7530 North Boulevard, Tampa, Fl, 33612

Inhalant anesthesia in rhinoceros has been reported on a couple of occasions. In all instances reported, euthanasia was performed or the rhino expired in the perianesthetic period from surgical complications. A four-year male black rhinoceros estimated at 1000kg was anesthetized twice and maintained on isoflurane and ventilated on two separate occasions for diagnostics evaluation of a fractured maxillary sinus. Combinations of detomidine, butorphanol, halperidol, xylazine, ketamine, and etorphine were used for pre-mediations and inductions. A 28mm endotracheal tube was placed with the aid of a 1.7m colonoscope and isoflurane was administered with intermittent positive pressure ventilation. Serial blood gas taken from an auricular artery, non-invasive blood pressure monitoring with the cuff on the base of the tail, oxygen saturation via pulse oximetry, and base apex electrocardiogram (ECG) monitoring were followed during the procedure when feasible. The rhino was maintained in sternal recumbency for the entire procedure. The elapsed time of isoflurane anesthesia for the first anesthesia was 172 minutes and 230 minutes for the second procedure. Recoveries were smooth and uncomplicated with the animal exhibiting normal behaviors within 2 hours of each event.

## Vocal Communication of the Black Rhino *Diceros bicornis* ssp.

Christa Budde, Georg Klump,  
Technical University of Munich (christa.budde@djh-freeweb.de)

Although rhinos have been the focus of many studies not much is known about their communication. A more detailed study has been done on the vocalizations of the Indian Rhino but not on the other rhino species. It was also suspected that all rhino species use infrasound signals for their communication but there is no detailed scientific investigation with a sufficient number of rhinos. This study investigates the audible vocal communication of the Black rhino *Diceros bicornis* ssp. and if there is evidence for the use of infrasound signals. The project also tests if individual identification by acoustic means is possible. Following zoos were visited for the investigations: Zoo Frankfurt with 1,1 *Diceros bicornis* minor, Dvur Kralove with 4,8 *Diceros bicornis* michaeli and Berlin with 2,7 *Diceros bicornis* michaeli. Recordings were performed with a Sony DAT recorder TCD D100 and a Sennheiser directional microphone. Acoustic data were evaluated with the help of the

Software Avisoft. Following parameters were measured: duration, minimum frequency, frequency with the highest energy, maximum frequency. Behavioural data were collected at the same time when recording. Following calls could be identified: Begging call, snort, hollow snort, growl, begging call of juvenile one year old and begging call of juvenile ten days old. There was no evidence for vocalizations in the infrasound range only. It can however, not be excluded that wild rhinos use infrasound for finding mates. Recording of wild rhinos was not possible in the frame of this study.

### Feeding Tannins to Captive Black Rhinoceros (*Diceros bicornis*): Results of a Pilot Study

M. Clauss, T. Froeschle, M. Lechner-Doll, J.-M. Hatt, U. Ganslosser, E.S. Dierenfeld  
Institute of Animal Physiology, Physiological Chemistry and Animal Nutrition,  
Munich, Germany; Zoological Institute I, Friedrich-Alexander-University,  
Erlangen, Germany;  
Institute of Zoo Biology and Wildlife Research (IZW) Berlin, Germany; Division of Zoo  
Animals and Exotic Pets, University of Zurich, Switzerland; Zoological Institute I,  
Friedrich-Alexander-University, Erlangen, Germany; Wildlife Conservation Society,  
New York

It has been postulated that the lack of tannins in captive diets for black rhinoceros (*Diceros bicornis*) might be responsible for the occurrence of iron overload in captive specimens. In theory, the presence of iron-chelating tannins in natural diets might have induced the evolution of an especially effective iron absorption mechanism in the species, which would lead to excessive iron uptake in the absence of such chelators. In order to investigate this problem, 5 captive rhinos were fed two diets, one with and one without a tannic acid supplement. Feed intake and faecal output were measured for two 5-day periods, respectively. Additionally, the use of several markers (Co-EDTA, Cr-mordanted fibre, n-alkane C36) as pulse-dose and steady state markers was assessed. The animals accepted the tannic acid-supplemented food without hesitation. Measured passage rates suggest that a 4-day collection period should result in total recovery of a pulse-dose marker. Iron concentration of faeces did not differ significantly between treatments and was apparently influenced by soil intake from the enclosure. We conclude that it is feasible to produce tannin-containing feeds for the further evaluation of iron metabolism in black rhinos. Either animals should be kept indoors during trials to prevent soil intake, or an iron isotope should be applied as a pulse-dose marker to compare recoveries between treatments. Additionally, we will present data on digestibilities and marker recoveries.

## Rhino Translocation in Nepal

Narayan P.D. Dhakal,  
Project Director, King Mahendra Trust for Nature Conservation  
(npdhakal@ecomail.com.np)

Since 1986, conservation organizations in Nepal are involved in rhino translocation to safeguard greater one horned rhinoceros (*Rhinoceros unicornis*) population. The rhinoceros from the Royal Chitwan National Park (RCNP) were transported and released in Royal Bardia National Park (RBNP) and Royal Suklaphanta Wildlife Reserve (RSWR) in various occasions. The aim of these translocations is to establish new populations of this mega-herbivore within Nepal. Similarly, objectives of the translocation programs are to reduce the risk of population extinction from any disaster in their single home & to minimize human-rhino conflict in the mother gene pool. Altogether, 62 (26 males and 36 females) rhinoceros were translocated in various years (1996, 1991, 1998, 1999 and 2000). Out of total translocated animals 58 (24 males 34 females) were released in RBNP and 4 (1 male and 3 females) in RSWR. The overall translocation activity can be categorized into three main steps. Firstly, pre translocation arrangements include the preparation of cages, selection of site for capturing, identification and determination of age and sex of the translocating animals and habitat assessment in the released site. Secondly, the translocation process starts by capturing and loading into the cage and truck and transported. Thirdly, the post translocation activity includes the monitoring of translocated animals to observe their behavior in the new habitat. The whole operation of translocation is planned and executed by the group of Nepalese experts, conservation professionals and wildlife technicians. The monitoring report of these rhinoceros indicates that these animals are well adapted in their new habitat.

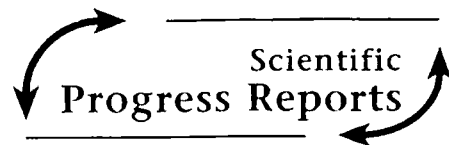
### Feeding Ecology of Desert Dwelling Black Rhinoceros *Diceros bicornis* L. in Kunene Region, Namibia

Udo Ganslosser<sup>1</sup>, Timo Gindrig<sup>2</sup>, Jens Henning<sup>2</sup>  
<sup>1</sup>PD Dr. University Erlangen-Nürnberg; <sup>2</sup>Student University Essen

Feeding ecology of black rhinoceros was studied in extreme arid Kunene region Northwest of Namibia (mean rainfall <150 mm/year), during the dry season from June to October 2000. Using the feeding track method showed, that rhinos were browsed on (about)\* 65 of (about)\* 140 encountered species (Loutit et al. (1987) 70 feeding species out of the total of 101 species). After the very good rain season 1999/2000 rhinos were feeding beside shrubs and woody species also on a high variety of herbs. The most heavily used feeding specie was the herb *Chamaesyca glanduligera* (Euphorbiaceae).

In comparison to the examination of Loutit et al. the study area varied slightly in a higher population density of black rhino and lower desert influence.

\* Please note: At submission date identification of plants and data evaluation was still in progress.



Harald M. Schwammer  
Thomas J. Foose  
Michael Fouraker  
Deborah Olson



## **Recent Research on Elephants and Rhinos**

Abstracts of the  
International Elephant  
and Rhino Research Symposium,  
Vienna, June 7-11, 2001