



**Research Committee
Newsletter
8th Issue, March 2002**

PD Dr. Udo Gansloßer
University of Erlangen
Dept. of Zoology I
Staudtstr. 5
D-91058 Erlangen
phone/fax: +911-9795800
email: udo@ganslosser.de

Foot problems in Indian Rhinoceroses (*Rhinoceros unicornis*) in zoological gardens: Macroscopic and microscopic anatomy, pathology, and evaluation of the causes

Friederike Freiin von Houwald, MSc, Inaugural Dissertation, University of Zurich, Switzerland, 2001 Contact: Zoo Basel, Binningerstrasse 40, Postfach, CH – 4011 Basel, Tel + 41 61 295 3545, Fax + 41 61 2810005 Email: vonhouwald@zoobasel.ch

Summary

Foot problems are a common finding in Indian rhinos kept in zoological gardens. Causes and prevention were up to now not scientifically examined. This study was set up to evaluate the occurrence and causes as well as the basic anatomical knowledge of the feet structures from zoo and wild animals. For this purpose 32 (13 males and 19 females) of 35 (15/20) Indian rhinos, living in 11 European zoos, were examined. In addition, a detailed anatomical study was performed on 6 feet of 2 deceased Indian rhinos. Samples of 18 hooves and 19 foot pads from 10 adult zoo animals were histologically studied. These results were compared with the findings of the macroscopic foot structures from 10 wild Nepalese animals.

The results show that all breeding bulls (11) as well as 50% of the adult females suffer from chronic foot problems. These problems show as cracks behind the central sole and the adjacent pad. Histologically, this area is made up of two different structures. The horn of the sole is hard and consists of long, thick, and almost straight running horn tubules. The adjacent soft pad is made up of small, thin, and undulating horn tubules. Wild animals do not seem to be affected by these pathological alterations. Their pad appears hard and thick and the soles are long and concave. The apical part of the pad does not seem to carry much weight. Due to hard and abrasive flooring material in indoor and outdoor enclosures, most zoo animals have thin pads and short and flat soles. They foot mainly on the pad. Chronic strain on this highly sensible and fragile area will lead to pathological alterations.

To prevent foot problems, husbandry aspects need to be change with emphasis on the provision of soft and non-abrasive flooring material. It is likely that less pathological problems will occur if the feet have a natural shape and if the weight is mainly carried be the weight-bearing border and the soles.

The aim of the study was to give a detailed description of the anatomy of Indian rhinoceros feet, to enlighten the courses, and to give recommendations how to prevent the occurrence of foot problems in Indian rhinos in zoological gardens.

Conclusion

The study shows that Indian rhinos are confronted with severe foot problems in captive collections. A causal correlation between husbandry and pathological changes is found due to the comparative, histopathological investigation with FP in domestic animals, as well as due to the structural comparison of the feet of 32 zoo animals with 10 wild rhinos. Due to this study an anatomical gain in knowledge concerning the basic foot structures in this species has helped to enlighten some of the pathological findings and supports the thesis that the Indian rhinoceros is naturally a 'sole-walker'.

Primary causes for the occurrence of FP are hard floors, which lead to abrasions on the horn walls, the soles, and the surface of the footpad. In the course of time, pathological alterations will appear within the horn walls and on specifically predisposed areas on the footpad.

Wild Indian rhinos do not show foot problems of this kind. The anatomical features of the horn structures of their feet look different, compared to zoo animals. The anatomical structures of their feet allow the conclusion that they are naturally 'sole-walkers'. Under captive conditions the animals turned into 'pad-walkers'.

The conclusion of this study is that zoo animals are kept under inadequate husbandry conditions that have led to the development of lesions on the footpad and horn walls.

The chronic lesions, especially those seen in the footpad do not show signs of complete regeneration, as most regenerated horn is of functional inferior quality. This inferior quality cannot withstand additional forces. As a consequence, these cracks will enlarge and granulation tissue is increasingly produced. This vicious circle can only be interrupted by means of a correct therapy and the simultaneous changing of husbandry conditions.

In order to maintain healthy foot and skin structures, the Indian rhinoceros needs a habitat where the feet do not wear and that supplies them with enough water to keep skin and horn structures elastic. Hard material is highly abrasive and should be replaced by soft, elastic flooring. In addition they should have constant access to water.

The aim of the future is to keep Indian rhinos whose feet are healthy and resemble in structures those of wild animals.

All the above-mentioned aspects are recommendations. They base on histological and comparative anatomical results of 32 captive and 10 wild animals.

Ethological contribution to the introduction of two new individuals (1.1) in a group of White Rhinoceroses (*Ceratotherium simum simum*) (1.2) in the Réserve Africaine de Sigean (France).

Mélanie Nemoz, Tel : 06.82.95.18.95

*Réserve Africaine de Sigean ,RN9, F-11130 SIGEAN, France,
Tel : 04.68.48.20.20 , Fax : 04.68.48.80.85*

The Réserve Africaine de Sigean is located in south of France. It is an extensive game park for wild animals : more than 3000 animals inhabit about 260 hectares of garrigue.

In accordance with EEP's advice, which "encourages to re-socialize White Rhinoceroses in order to stimulate breeding", two new individuals (1.1) arrived at the Réserve Africaine de Sigean the 27th of last March. The study consisted of introducing the two new individuals (2 years old) to the elder group (1.2) (all of them are more than 12).

The two groups were in distinct enclosures. Three periods of observation of about one month had been distinguished : all three permitted auditory, olfactory, visual and tactile contacts through bars all day long. Every day of the second period, bars between the two enclosures were opened for about one hour per day. The situation was nearly the same in the third period, but adults were not present in their enclosure.

Both of the two adult females didn't seem interested in the new individuals unlike the adult male, who was very aggressive when the young rhinoceroses were in his enclosure (it charged them systematically) in the second period. This aggressiveness decreased at the time of interactions through bars, and non agonistic behaviours could be observed. The hypothesis of two distinctive territories (the two enclosures) is the most suitable. It is supported by the high number of the adult male's urine-marks close to the bars, and by the young Rhinoceroses' submissive behaviour. Both of them ran away from the male when they were in his enclosure, but they had tactile contacts through bars with him.

The male turned its aggressiveness particularly to the young male. How-