

Documentation of the Hormonal Cycle of Female Black Rhinoceroses (*Diceros bicornis*) Using Ultrasonic Diagnosis and Subsequent Computational Analysis.

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The aim of our study is to develop computer software which allows to determine the cycling status of free-living, adolescent rhinoceroses during transrectal ultrasonic examinations. Preparation for the development of the software mentioned above started in the Leipzig Zoological Garden on

June 2, 1999. At present, we have access to two female rhinos for preparation of the required image data. Extensive construction work in and around the enclosure was carried though to be able to perform the intended examinations. Analyses of hormone levels in droppings have been performed and documented for several months. For the development of image interpretation software, we work on ultrasonic video material produced with female horses to test the validity of the approach. It is planned to exchange video material with them as soon as data on the rhinos has been collected. The ultrasonic video documentation is analysed and annotated using gynaecological literature.

Example:

Formation of a corpus luteum, or ovulation, have been tentatively recognized. In this case, a technical term like „oestrus“, and the presumed time point within the ovarian cycle can be added to the material. This assignment can later be checked based on the measured levels of the sexual hormones. The completely assigned video material is stored in chronological order, following the ovarian cycle. The video material which is transformed into the computer software is ready to be used. In future applications, free-living female rhinos exactly like those performed on the trained rhinos in Leipzig (defined procedural order and defined spatial orientation, for example relative to the cervix, etc.). The images of the female reproductive organs obtained in the field study are fed into a laptop computer, which compares the data to the scientifically evaluated images of the trained rhinos using the diagnostic software. This software should enable the researcher to obtain reliable data on the ovarian cycle of both free-living and captive female black rhinos. The new diagnostic tool is expected to make accessible biotechnological reproductive techniques which have been extensively tested and optimized with domesticated mammals.

Potential applications

- detection of ovarian cycle anomalies and the resulting cycling changes

- determination of ovarian cycle phase and definition of optimal time for artificial insemination
- obtaining precise data on periodic changes of the ovary
- detection of pathologically altered female reproductive organs
- early detection of pregnancy
- rational selection of rhinos for breeding
- diagnostic support for embryo transfers

We hope that this short summary has given you an impression of our current and future work in Leipzig Zoological Garden. We always welcome suggestions and ideas which might benefit the project. Large Animal Clinic for Theriogenology and Ambulatory Services / An den Tierkliniken 29; 04103 Leipzig, Leipzig Zoological Garden / Pfaffendarfer Straße 29; D-04105 Leipzig

Diet of black rhinoceros in zoological gardens: composition, intake and digestibility

Tanja Fröschle, DVM dissertation
(Supervisors Prof. Eulenberger & PD Dr. Udo Gansloßer)

This dissertation will be about the nutrition of black rhinos (*Diceros bicornis*) in captivity.

Rhinoceros (family: Rhinocerotidae) as well as tapirs (family: Tapiridae) and equids (suborder: Hippomorpha) be-

long to the odd-toed mammals (order: Perissodactylia).

There are four genera and five species of rhinoceros. In Asia there are the greater one-horned rhinoceros, the Javan and the Sumatran rhinoceros. In Africa it's the white or square-lipped rhinoceros and the black or hook-lipped rhinoceros. All of them are endangered species and more or the less close to extinction. Therefore all of these animals are of extraordinary significance, especially the ones kept by humans.

There are only about 2500 black rhinos left in the wild, in captivity there's about 200. Black rhinos are browsers, in the wild their diet consists of leaves and stems of woody plants. There's not much known about their nutrition in captivity yet.

It's supposed that malnutrition and stress are the cause for diseases and bad reproduction in black rhinos kept by humans. So there's a lot to be found out about their feeding in captivity.

For this thesis the diet of rhinos in different zoological gardens is going to be observed, the results will be compared in an international study.

The black rhinos for this study are kept in the zoological gardens of Berlin and Leipzig. It'll be two animals out of each group, being observed for a period of five consecutive days.

It'll be protocolled what kind of food the rhinos get and how much of it they'll eat. Also the fecal output will be measured. There'll be taken samples of the food as well as of the feces,

after the five-day-period there's also been taken blood samples of each animal.

The samples shall be analyzed at the laboratories of the university in Leipzig.

Ethological contribution to the White rhinoceros (*Ceratotherium simum simum*) reproduction in captivity.

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The RŽserve Africaine de Sigean exhibits three White rhinoceros (*Ceratotherium simum simum*), which have never reproduced. This study involved leaving, progressively, the animals together as long as possible, to find out what would be the consequences on their time budget, but especially on their reproduction. To determine the females reproductive cycles, analysis of the progesterone metabolite have been made.

Leaving them together have changed their daily activity pattern. Concerning reproduction, the male tends to be less aggressive in presence of the female: all day long, whereas both females show constant aggression toward the male. The female hormone analysis data indicated the ab-

sence of any reproductive cycle, which could explain the constant number of offensive interactions against the male observed per hour, during the analysis time. Finally, the male's behavior is more related to reproduction while not being separated from the females.

Key words:

White rhinoceros, reproduction in captivity, agonistic interactions, behavior related with reproduction, time budget.

An Experimental Study of Foraging in a Group of Bongo (*Tragelaphus euryceros*) at Nürnberg Zoo

Gabriele Volkmann, Master Thesis,
Zoologischen Institut der Friedrich-Alexander-Universität Erlangen-Nürnberg, 2000, Supervisor:
PD Dr. Udo Gansloßer

In the following paper the feeding behaviour of the Bongo-antelope was tested. This was practised with a group of bongos (1; 2; 3) in the zoo of Nuremberg. I explored five normal and four various changed feeding situations. For the normal situations (1; 3; 5; 7 and 9) the animals were fed with fresh grass in their enclosure. During the various situations in each case a new kind of food was put into the enclosure: These were feeding

branches in situation 2 and 1 put apples and carrots into the enclosure in situation 4. During situation 6 the grass was replaced by hay and white beet. In situation 8 the grass was supplemented by pellets, fruits and vegetables.

The effects of the new feeding types on different behavioural patterns had to be investigated. First I examined, if the animals fed more or less grass during the new feeding situations. Then I tested the influence of the new food on the activity of the study animals. The following behavioural patterns were examined here: standing, lying, walking and chewing the cud. Besides I examined the influence to one stereotype behaviour, "licking the fence". Additionally the social interactions were observed. These were aggressions, retreat and sociopositive interactions. I also investigated the group cohesion (social distances; being alone or close to the animal X).

All behavioural patterns, except the social interactions, were compared with each other for every animal. Additionally the animals were compared with each other in every feeding situation.

The amount of grass eaten by the animals depended on the quality of the new food. White beet, pellets, fruits and vegetables are more concentrated and lower fibrous than feeding branches and hay. The amount of grass being eaten was influenced more by fibrous kinds of food than by the con-

centrated food.

The individuals of the group did not take the same period of time to feed the new food. There were differences depending upon the popularity of the food and the rank position of each individual within the group. The male bongo and the juveniles eat longer of these kinds of food than the two female bongos.

The activity of the animals was not influenced by the feeding situations. The individuals showed many differences in their individual activities. The male and the juveniles were lying much more than the females.

The behavioural pattern "chewing the cud" was correlated with the behavioural pattern "lying". There are nearly the same results here, especially within the comparisons of the animals with each other. Chewing the cud is dependig upon the kind of food given to the animals. The stereotype behaviour of "licking the fences" was a special problem of one of the females. During the new feeding situations this behaviour pattern decreased.

The social behaviour has also been influenced by the new feeding situations. The aggressive behavioural patterns, being shown by all individuals, increased. The amount of retreat increased too. With this behavioural pattern I found out the rank position of each individual within the group. The highest rank was occupied by the male. The juveniles were nearly not affected by the adults' rank positions. The sociopositive interactions have