Stimulation of Territorial and Mating Behaviour by Faecal Samples. A Comparative Study on Behaviour of Captive and Free-Living White Rhinoceros

P. Kretzschmar[1]; U. Ganslosser[1]; A. Goldschmid[2]; Aberham; A.[2]
[1]Zoological Institute I, Friedrich-Alexander University of Erlangen-Nürnberg, Staudtstr. 5, 91058 Erlangen, Germany;
[2]Zoological Institute, University Salzburg, Hellbrunnerstraße 34, 5020 Salzburg, Austria;

Introduction

Urine and feces used for territorial marking in white rhinoceros (Owen-Smith, 1973), are supposed to carry information, e.g. on the presence of other individuals as well as their state and age (Johnson, 1973). Today breeding problems in white rhinoceros are tried to be solved at present by shifting individuals between different enclosures (Ruempler, 1991). If it could be shown that excrements carry information, the breeding problem could possibly solved by simulating the presence of other animals with olfactory markings. In the present study we analysed territorial marking behaviour of a free living population and explored whether the presence of other animals could be simulated by olfactoric stimuli in zoo populations.

Methods

The zoo study was carried out with a group of five white rhinos (1.4) in the zoo of Erfurt, Germany. Faecal samples from five males of different locations ("Safaripark Hodenhagen", Germany and "Tiergarten Hellbrunn", Austria) were introduced to the population and their behaviour was observed (n= 300 hrs). Three different trails were carried out: 1. control (K): introduction of peat, 2. experiment A: introduction of feces from males of 18 - 42 years, 3. experiment B: introduction of feces from males of 6-9 years (Experiment B). Data were collected using scan-animal sampling and focal-animal sampling, at 10-min and 15-min intervals. The field study was conducted on a free living population in South Africa. The position of urine and dung marking of adult territorial males were obtained during tracking of the animal. The position of urine and dung markings were mapped with a Global Positioning System.

Results

Zoo study

The male showed significantly more olfactory exploration (72 %) than adult (11 %) and subadult females (17 %, fig. 1).

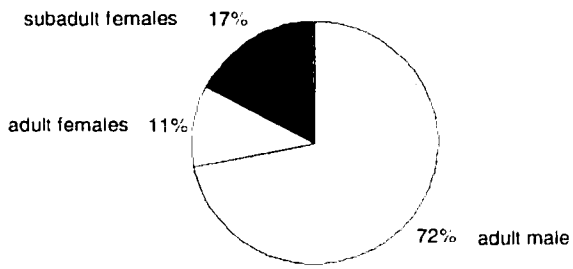

Fig 1: Percentage of sniffing of the adult male and the adult and subadult females on feces, samples and urine (n= 473, Student-Newman-Keuls Test, 2- tailed: male/ad. females: p = 0.001, q = 18.47; male/subadult females: p = 0.001, q = 11.12).

Marking behaviour was significantly more frequent after introduction of feces from males of different ages (18-42 years: A, 6-9 years: B) than after introduction of peat ((K), n =136, Siegel and Castellan 2- tailed: K/A: p = 0.001, q = 3.60; K/B: p = 0.001, q = 4.38, fig. 2.)

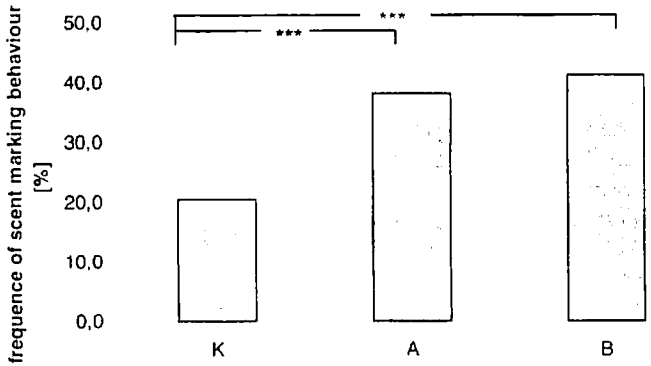

Fig. 2: Frequency of marking behaviour for three different trials: introduction of peat (K), of feces from older males (A), of feces from younger males (B). (n =136, Siegel and Castellan 2- tailed: K/A: p = 0.001***, q = 3.60; K/B: p = 0.001***, q = 4.38).

The male overmarked (with feces and urine) the feces of subadult females more often than the feces of adult females and his own (n = 62, Siegel and Castellan 2- tailed: male/subadult females, p = 0.001, q = 4.47; adult females/ subadult females p = 0.001, q = 3.96, fig. 3). The subadult females were cycling and/or showed behaviour characteristic for cycling females.

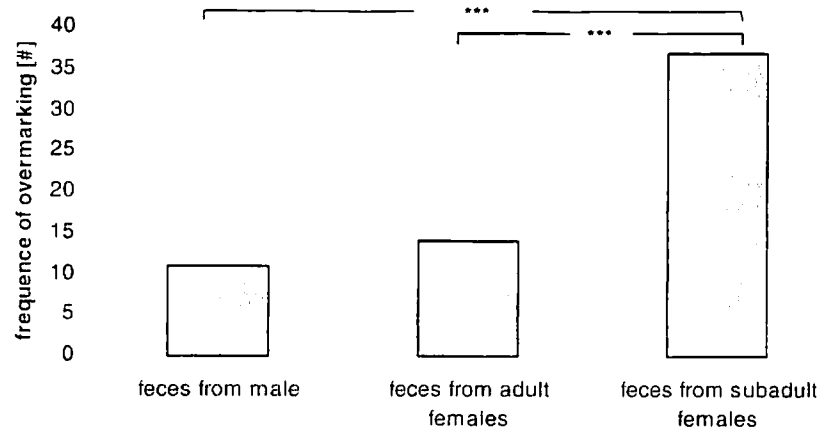

Fig. 3: Frequency of over-marking of feces from the male, adult and subadult females shown by the adult male (n = 62, Siegel and Castellan 2- tailed: male/subadult females, p = 0.001***, q = 4.47; adult females/ subadult females p = 0.001***, q = 3.96).

Free ranging animals:
Spray marks were found significantly closer to the border territory border (354 m, IQR = 977 m, n = 924) compared to feces (664 m, IQR = 993 m, n = 112; Mann-Whitney test: Z = -3.4, p = 0.001, fig. 4).

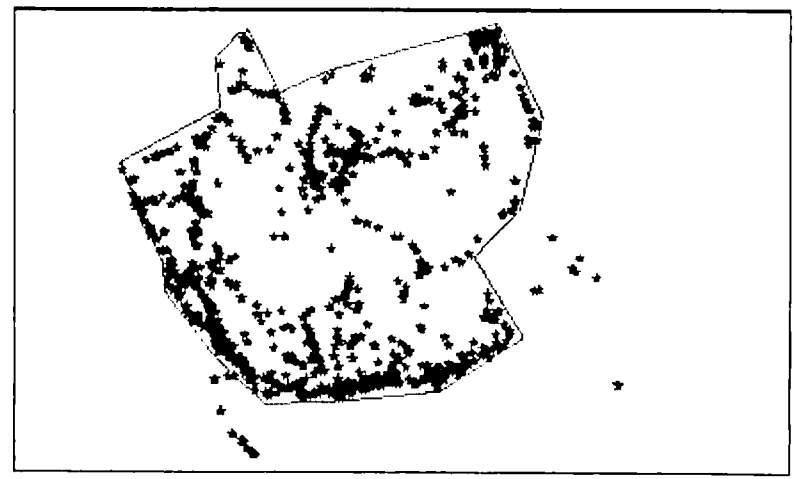

Fig. 4: Spray marks of a free ranging territorial male. The stars indicate the place of the spray marks, the dotted line illustrates the course of the territory border. (354 m, IQR = 977 m, n = 924) compared to feces (664 m, IQR = 993 m, n = 112; Mann-Whitney test: Z

Conclusion

Scent marks play an important role in the behaviour of adult males. Males showed a high interest to introduced feces from other animals.

They were able to discriminated between feces of other males and peat and showed an increase in scent marking behaviour as response. Feces and spray marks were used to overmark the feces of cycling females in the zoo. Feces of free-living territorial males were placed all over the territory, and were not used as boundary marks. In contrast to that spray marks were used to mark territorial borders.

This suggests that both feces and spray marks are important in transferring informations between rhinoceros, but that they are used in a different context. Spray marks are used as territorial defence, while feces are more used as information about the presence of an animal and both mask the feces of cycling females. Introduction of feces into a zoo population is a useful tool to simulate the presence of other animals and to stimulate territorial behaviour in adult males. Shifting feces between different enclosure rather than rhinos could therefore be an alternative management strategy.

References

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A Program of Managed Breeding for the Sumatran Rhinoceros at the Sumatran Rhino Sanctuary, Way Kambas National Park, Indonesia

Muhammad Agil[1], Marcellus Adi C.T. Riyanto[2], Tony Sumampau[3] J. Keith Hodges[4] and Nico J. Van Strien[5]

[1]Centre for Life Sciences Study and Faculty of Veterinary Medicine, IPB, Bogor,Indonesia

[2]Sumatran Rhino Sanctuary Way Kambas-Lampung, Yayasan Suaka Rhino Sumatera, Indonesia

[3]Taman Safari Indonesia (TSI), Bogor, Indonesia

[4] German Primate Centre, Goettingen, Germany

[5] Asian Rhino Specialist Group, International Rhino Foundation

(rhinogil@indo.net.id)

The Sumatran rhinoceros is the most critically endangered of the rhinoceros species with less than 300 individuals estimated to remain in the wild, a decline of more than 50% of the total alive 10 years ago. Furthermore the international effort to establish a managed breeding population for future re-introductions, has had limited success. Since its start in 1985 almost three-quarters of the animals have died and pairing and breeding has been problematic, with only one advanced pregnancy to date (Cincinnati, USA). As part of an effort to improve the chances for propagation by providing a more natural environment and social structure, the Way Kambas Sumatran Rhino Sanctuary (SRS) was founded in 1995. The sanctuary comprises 100 ha of mature secondary rain forest, located within the 125,000 ha Way Kambas National Park, Sumatra, Indonesia. The SRS provides a minimum of 20 Ha of native habitat for each individual and allows mixing and separation of animals as required. The founder animals, 2 females from Indonesian zoos and a male from the UK, arrived in 1998. Recently one of the females, an old and un-reproductive animal, died. The remaining pair is in prime condition and has breeding potential. Animals are monitored continuously during daylight hours, and full-time during the breeding periods, and extensive data on activity patterns, feeding and reproductive behaviour have been collected over the past 3 years. Morphological parameters and faecal and urinary hormone excretion patterns have been used to determine reproductive status of the females. For the latter purposes, a hormone assay laboratory has recently been established at the Centre for Life Sciences Study, Bogor Agricultural University. Initial attempts at non-invasive semen collection have also been carried out. This poster presents the results of 3 years of research and briefly discusses the contribution of the SRS to the conservation efforts for the Sumatran rhino.

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