

Research

Using Behavioral Cues of Males for Timing Reproductive Pairing in Black Rhinos

Promoting successful breeding is central to maintaining healthy zoo populations. For some species, such as the critically endangered

black rhino, this task can prove challenging. Black rhinos are a semi-social species and are often housed separately in zoos. Knowing when to pair male and female rhinos is crucial for breeding success but complicated by marked variability of oestrous cycles. Previous non-invasive hormonal monitoring has indicated oestrous cycles can vary both in length and consistency. In this study, the behavior of a male black rhino at Lincoln Park Zoo in Chicago, Ill., was studied in conjunction with fecal hormonal monitoring in the male and female rhino to determine if behavioral cues serve as reliable indicators of oestrous. Several of the male rhino's behaviors were observed to vary based on oestrous cycles, including exhibiting an erect penis and investigating the female's urine and feces. Both of these behaviors were displayed more frequently during the female's follicular phase than luteal phase. These behavioral indicators were used to time breeding introductions that resulted in a successful pregnancy. Complimenting traditional hormonal monitoring data with behavioral information can provide additional insights and enable real-time animal management strategies to promote reproductive success.

Santymire, R.M., Misek, S., Gossett, J., Kamhout, M., Chatroop, E. and Rafacz, M. 2016. Male behaviours signal the female's reproductive state in a pair of black rhinoceros housed at Lincoln Park Zoo. *Journal of Zoo and Aquarium Research* 4(1). Correspondence to Rachel Santymire at rsantymire@lpzoo.org.



Validation of Activity Levels Measured by Accelerometer Devices

Accelerometer devices worn by animals have the potential to provide continuous 24/7 monitoring of behavior states with minimal effort and invasiveness. Previous research has validated the use of accelerometers mounted inside collars for detecting different activity levels in zoo-housed African elephants. The current study expands this research by validating simple analysis methods for identifying activity levels. The authors concluded that easily calculated standard deviation measures of accelerometer data yielded comparable results to complex methods used in previous studies. In addition, mean measures of accelerometer data were able to successfully identify upright vs. recumbent postures. As battery life and storage space are limiting factors for accelerometer use, the authors also analyzed different sampling rates and analysis durations

on accuracy of activity level identification. To properly identify activity levels, high sampling rates (at least 1 sample per second) were necessary, but sampling periods used to calculate metrics could be relatively long (5 min). Using accelerometer data, the authors compared information from three adult female elephants housed at Disney's Animal Kingdom® to three adult females in Samburu-Laikipia, Kenya. Although both groups spent a majority of their time in low activity behaviors, the Kenyan elephants did display generally higher activity levels and less restful recumbence compared to zoo-housed elephants. Although accelerometer devices may not be suitable for all species due to body size or species characteristics, this study highlights the potential for these devices to provide reliable activity level information for some animals beyond the capability of traditional observational approaches.

Soltis, J., King, L., Vollrath, F., Douglas-Hamilton, I. 2016. Accelerometers and

simple algorithms identify activity budgets and body orientation in African elephants *Loxodonta Africana*. *Endangered Species Research*, 31: 1-12. DOI:10.3354/esr00746 Correspondence to Joseph Soltis at joseph.soltis@disney.com.

Emotional Responses of Visitors When Observing Animal Behaviors

Seeing animals is central to the zoo or aquarium experience, and the behavior of the animals during those moments may influence the visitor's emotional response. This study evaluated the reaction of guests after viewing animals at three different zoos. Species included in this study were giraffe and lion at Brookfield Zoo in Brookfield, Ill., cheetah at San Diego Zoo Safari Park in Escondido, Calif., and red panda at the Central Park Zoo in New York, N.Y. Visitors were asked to select what behaviors they had observed and to rate the intensity of their emotional experience while viewing the animals.

The authors found visitor predispositions to animals, nature and conservation varied across the three sites. However, viewing active animals was found to be positively associated with positive affect, even when differences in predispositions were accounted for. When visitors viewed inactive animals, or were not able to see animals, they responded with lower positive affect scores. The perceived proximity of animals may have also influenced these responses, as visitors who had an up-close encounter had more positive affect scores. This effect was greater than whether they had viewed active or inactive behaviors. The specific guest experience when approaching an exhibit is difficult to predict, but efforts to promote active behaviors—even at minimal rates—and close viewing opportunities would appear to encourage a positive emotional experience. This may have important implications for behavioral and learning outcomes of zoo and aquarium visits.

Luebke, J.F., Watters, J.V., Packer, J., Miller, L.J., Powell, D.M. 2016. Zoo Visitors' affective responses to observing animal behaviors. *Visitor Studies*, 19(1): 60-76. DOI: 10.1080/10645578.2016.1144028 Correspondence to Jerry Lubke at jerry.lubke@czs.org.