

Investigating reproduction and population performance in the European captive population of eastern black rhinoceros (*Diceros bicornis michaeli*)

EDWARDS KATIE L^{1,2}, SHULTZ SUSANNE³, PILGRIM MARK¹, WALKER SUSAN L¹

¹North of England Zoological Society, Chester Zoo, Caughall Road, CH2 1LH Chester, UK; k.edwards@chesterzoo.org

²University of Liverpool, Institute of Integrative Biology, Crown Street, L69 7ZB Liverpool, UK

³University of Manchester, Faculty of Life Sciences, Oxford Road, M13 9PT Manchester, UK

With fewer than 5,000 black rhinoceros (*Diceros bicornis*) left in the wild, *ex situ* populations play a vital role in the conservation of this species. However, the European captive population of the eastern black rhinoceros (*D. b. michaeli*) is currently underperforming compared to their *in situ* counterparts, with annual growth rates of only 1 - 2 %, compared to > 5 % *in situ*. In recent years, the primary factor limiting growth of this population has been low rates of reproduction, with only around 11 % of adult females breeding each year. Furthermore, approximately 40 % of reproductive-age individuals are yet to successfully produce offspring, resulting in high reproductive skew in both males and females. To investigate differences in reproductive success, faecal samples were collected from 23 males and 39 females at 13 institutions across Europe, and used to measure reproductive and adrenal hormones by enzyme immunoassay. In females, approximately three-quarters of all oestrous cycles observed were 20 - 40 days in length, but irregular cyclicity was also apparent in both parous and nulliparous females, with short (< 20 days) and extended cycles (> 40 days) often exhibited over a 12-month period. Overall there were no differences in average faecal glucocorticoid metabolite concentration between parous and nulliparous females; however, long cycles were more often observed in nulliparous females, and within females were associated with elevated faecal glucocorticoid metabolite concentration compared to other cycle types. In males, faecal testosterone metabolite concentration was higher in males that had previously sired offspring than those that had not, but this was unrelated to faecal glucocorticoid concentration. Intrinsic differences in reproductive hormone profiles may be related to differential reproductive success observed in both male and female black rhinos in this population, and research is on-going into what other factors may be involved.