

162 REPRODUCTIVE CYCLES, PREGNANCY AND REVERSAL OF LONG TERM ACYCLICITY IN CAPTIVE SOUTHERN WHITE RHINOCEROS AT HAMILTON ZOO

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Abstract

In 1999, the New Zealand captive population of Southern white rhinoceros (*Ceratotherium simum simum*) was increased with the addition of six wild-caught founders. We report on the breeding success of two females (est. 5 to 6 years at import) and a female born in 2000 (conceived in the wild). Fecal samples were collected 1 to 3 times per week from females ($n = 3$) for several periods (5 to 24 months) between 2000 and 2008. Reproductive cycles and pregnancy were characterized using fecal progesterone concentrations, observations of courtship behaviour and parturition dates. The average length of the reproductive cycle was 31.6 ± 0.6 days (range 26–38 days, $n = 34$ cycles). Four pregnancies were confirmed in one female with a sex ratio of 1 female to 3 males (including 1 male loss at an estimated 5 months of gestation), known gestation lengths were 514 and 507 days. In the non-reproducing adult female, long cycles (67.2 ± 1.3 days, $n = 5$) were detected in addition to regular cycles (31.9 ± 0.9 days, $n = 13$) during the first 3 years in captivity, consistent with previous reports (Schwarzenberger F *et al.* 1998 *An. Repro. Sci.* **53**, 173–190; Brown JL *et al.* 2001 *Zoo Biol.* **20**, 463–486). The absence of breeding behavior and low progesterone concentrations for an extended 4-year period was cause for concern for the Australasian Species Management Programme managers (Hermes R *et al.* 2004 *An. Repro. Sci.* **82–83**, 49–60; Hermes R *et al.* 2006 *Theriogenology* **65**, 1492–1515). In 2007, the social structure of the Hamilton Zoo rhinoceros group was altered by exchanging the breeding male and two male offspring for a wild-caught male from Auckland Zoo. Within two months of arrival the long-term acyclic female had resumed cycling and had conceived six months after introduction of the new male. The young captive-born female continued to have regular length cycles and mating was observed with the new male. Recently, early embryonic loss was determined by ultrasound in the young female having a long 70 day cycle determined by fecal analysis. Fecal progesterone concentrations were useful for diagnosing pregnancy after 3 months gestation with concentrations four times higher than luteal phase concentrations by 9 to 12 weeks after mating ($n = 3$). Two females exhibited seasonal acyclic periods characterized by low progesterone concentrations corresponding to decreasing daylength (autumn and winter months). Fecal progesterone monitoring of reproductive status and pregnancy combined with behaviour observations has provided valuable information for breeding management decisions and planning for parturition in this population. The reversal of long-term acyclicity and a resulting pregnancy that represents two original founders is particularly significant for the genetic diversity of the Australasian population of white