

PhD Dissertation Defense

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Title: The Effect Of Environment On The Reproductive Potential Of Ex Situ Cheetahs (*Acinonyx Jubatus*)

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ABSTRACT

The cheetah (*Acinonyx jubatus*) is recognized as threatened due to extirpation from most of its historic range, with continuing declines resulting in only about 10,000 individuals remaining today. Scientists have been studying cheetahs for more than 30 years, but the species fails to reproduce consistently in captivity. Only about 20% of animals in the North American Species Survival Plan population have ever reproduced, causing reliance upon imported cheetahs from Africa to sustain ex situ population numbers. Although the species is known for low genetic variation and the production of 75% malformed spermatozoa per ejaculate, the relatively high rate of reproduction of free-ranging cheetahs indicates that these traits do not ultimately cause poor reproductive success. Rather, it appears that ex situ cheetahs require specific husbandry and management techniques to encourage breeding success. Therefore, the main focus of this research was to investigate the effects of multiple management-related environmental factors on reproductive potential of male and female cheetahs. A secondary focus was, for the first time, to validate a testosterone enzyme immunoassay to assess fecal metabolite concentrations and generate longitudinal gonadal hormone profiles for male cheetahs. Data generated for this purpose revealed support for a lack of seasonality in male cheetahs and remarkable variation of glucocorticoid concentrations within and between individuals of both sexes. The management practice of housing male cheetahs in groups has significant positive

impacts on testicular functionality, and one male within each group appears to enjoy the majority of the benefits of this increase in reproductive potential. This male also initiates the most behaviors with group members and could be viewed as dominant in status. Human exposure, both indirectly through public exposure of enclosures and directly through interaction with high numbers of keeping staff, has marked negative impacts on reproductive metrics in male cheetahs. Analysis of females found no relationship between environmental factors and ovarian or adrenal hormone concentrations, however there was a positive relationship between short-term glucocorticoid and estrogen production, perhaps a by-product of increased physical and adrenal activity occurring near times of maximal ovarian activity. Results from this work will be used to recommend changes in management protocols to improve the reproductive potential of cheetahs in managed collections. These changes are crucial for establishing a self-sustaining captive population, therefore ensuring a more stable future for this beautiful and unique species.