

Noninvasive Assessment of Adrenal Activity Associated with Husbandry and Behavioral Factors in the North American Clouded Leopard Population

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The North American clouded leopard (*Neofelis nebulosa*) population is far from self-sustaining. Breeding success is poor and behavioral problems (i.e., fur-plucking, tail-chewing, excessive hiding or pacing, and intersexual aggression that results in mate killing) are common. This study was undertaken to investigate whether some of these problems may be indicators of chronic stress (as reflected by persistently elevated glucocorticoid levels) and whether they are associated with specific management factors. A fecal corticoid metabolite assay was validated to monitor adrenal activity in clouded leopards. Adrenocorticotrophic hormone (ACTH) challenges conducted in four clouded leopards established the biological relevance of the assay system. Fecal corticoid concentrations increased 14-fold above baseline within 24 hours after ACTH administration. Adrenal activity then was monitored in 72 (36 males; 36 females) clouded leopards (65% of the North American Species Survival Plan population) during a 6-week period and compared to husbandry and behavior data. There was a significant ($P < 0.01$) gender difference in fecal corticoid concentrations, with females producing higher concentrations than males. Multiple regression analyses revealed negative associations ($P < 0.01$) between enclosure height, number of hours keepers spent with each animal per week, and corticoid concentrations. A positive correlation ($P < 0.001$) was found between the number of keepers caring for an individual and corticoid concentrations. Higher fecal corticoid concentrations ($P \leq 0.05$) were measured in clouded leopards kept on public display or near potential predators compared to individuals maintained off exhibit or in the absence of predators. Individuals that performed self-injuring

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