BioOne RESEARCH EVOLVED

IMMOBILIZATION OF FREE-RANGING MANED WOLF (*CHRYSOCYON BRACHYURUS*) WITH TILETAMINE AND ZOLAZEPAM IN CENTRAL BRAZIL

Author(s): Mariana Malzoni FurtadoD.V.M., Cynthia Kayo KashivakuraD.V.M., Claudia Ferro, Anah Tereza de Almeida JácomoPh.D., Leandro SilveiraPh.D., and Samuel Astete
Source: Journal of Zoo and Wildlife Medicine, 37(1):68-70. 2006.
Published By: American Association of Zoo Veterinarians
DOI: http://dx.doi.org/10.1638/05-036.1
URL: http://www.bioone.org/doi/full/10.1638/05-036.1

BioOne (www.bioone.org) is a nonprofit, online aggregation of core research in the biological, ecological, and environmental sciences. BioOne provides a sustainable online platform for over 170 journals and books published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Web site, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/page/terms_of_use.

Usage of BioOne content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Journal of Zoo and Wildlife Medicine 37(1): 68–70, 2006
Copyright 2006 by American Association of Zoo Veterinarians

IMMOBILIZATION OF FREE-RANGING MANED WOLF (*CHRYSOCYON BRACHYURUS*) WITH TILETAMINE AND ZOLAZEPAM IN CENTRAL BRAZIL

Mariana Malzoni Furtado, D.V.M., Cynthia Kayo Kashivakura, D.V.M., Claudia Ferro, Anah Tereza de Almeida Jácomo, Ph.D., Leandro Silveira, Ph.D., and Samuel Astete

Abstract: A tiletamine hydrochloride–zolazepam hydrochloride combination was used successfully to immobilize 27 free-ranging maned wolves (*Chrysocyon brachyurus*) at a mean dose of 2.77 ± 0.56 (mean ± SD) mg/kg. The induction time ranged from 3–15 min. Animals remained immobilized for periods of 48.56 ± 12.65 min. Compulsive licking, excessive salivation, muscle twitching, muscle tremors, tachypnea, and bradycardia were observed associated with the induction of the anesthesia in 13 of 27 maned wolves. Muscle twitching, pedal withdrawal reflex, muscle tremors, and ataxia were observed during recovery in three (11%) maned wolves. There were no significant differences in heart rates ($P = 0.44$), respiratory rates ($P = 0.82$), and rectal temperatures ($P = 0.54$) recorded at 5, 15, and 25 min after induction at these dosages. The tiletamine hydrochloride–zolazepam hydrochloride combination was shown to be an effective and safe immobilizing agent for free-ranging maned wolves.

Key words: Chemical immobilization, *Chrysocyon brachyurus*, free-ranging, immobilization, maned wolf, tiletamine–zolazepam.

BRIEF COMMUNICATION

The maned wolf, *Chrysocyon brachyurus*, is the largest wild canid inhabiting South America and protocols for safe, practical, and effective immobilization of these animals are limited. Field immobilization involves administration of anesthesia to animals under the most difficult circumstances and imposed without the benefit of any preanesthetic evaluation and preparation.[6,11]

A combination of tiletamine hydrochloride and zolazepam hydrochloride has been safely used to immobilize several carnivore species, both in captivity and in the wild.[1,7,8] It offers the advantage of a small administration volume, high potency, wide safety margin, and rapid induction.[7]

The effectiveness and safety margins of tiletamine–zolazepam dosages developed for captive maned wolves have not been tested on wild animals. The stress and excitement of capture and handling could affect induction and recovery times, as well as heart rates, respiratory rates, and body temperatures.[4,12] This combination also provides good cardiac and respiratory support compared to the potential bradycardic and respiratory depressant effects of alpha-2 agonists.[8] The objectives of this study were to evaluate the tiletamine–zolazepam combination for immobilizing maned wolves in the wild and to recommend effective tiletamine–zolazepam doses.

In Emas National Park, central Brazil, 27 maned wolves (14 males and 13 females) were captured from July 2001 through November 2003 during a long-term monitoring study of ecology, conservation, and epidemiology. Wolves were captured in metal cage live traps baited with pigeon or chicken. The traps were localized inside and in the surrounding areas of Emas National Park and were checked once a day.

The captured maned wolves were immobilized with a tiletamine–zolazepam combination (Zoletil®, 50 mg of tiletamine and 50 mg of zolazepam per ml; Virbac S.A. 06516 Carros cedex—France), given i.m. between the semimembranosus and semitendinosus muscles with a hand-injected syringe and a 25 × 6–mm needle. The dose chosen for each animal was based on a visual estimate of the individual's weight; a dose of 2.5 mg/kg was estimated and consequent dose rates were calculated retrospectively with known body weights. After anesthetic induction, wolves were weighed using a scale and the biometry of the body was made with a measurement tape; blood, feces, urine, and ectoparasites were sampled. Physical examinations were performed and each animal was fitted with a radio collar. Wolves were aged as adult or subadult based on body mass, tooth wear, and morphological measurements.

During immobilization, heart rate, respiratory rate, and rectal temperature were recorded. Physi-

From Jaguar Conservation Fund, P.O. Box 193, Mineiros-GO, 75830-000, Brazil (Furtado, Kashivakura, Ferro, Jácomo, Silveira, Astete) and Instituto Pró-carnívoros (Jácomo, Silveira) João Soares do Amaral, 112, Atibaia-SP, 12941-600 Brazil. Correspondence should be directed to Dr. Furtado.

Table 1. Body weight, doses, induction time, and recovery time of free-ranging maned wolves immobilized with a combination of tiletamine hydrochloride and zolazepam hydrochloride in Emas National Park, central Brazil, from July 2001 through November 2003.

	Body weight (kg)	Dose (mg/kg)	Induction time (min.)	Immobilization period (min.)
Mean	26.69	2.77	7.33	48.56
SD	±2.60	±0.56	±2.89	±12.65

ologic parameters were recorded at 5, 15, and 25 min after drug administration. For each animal, the effectiveness of the anesthesia was evaluated with regard to induction and recovery; physical reactions (e.g., vomiting, excessive salivation, compulsive licking, muscle twitching, pedal withdrawal reflex) were also noted. Data from recaptured animals were not included in the analyses.

Induction period was defined as the time between the injection of anesthetic and full immobilization, when the animal's head was down and it was unresponsive to external stimuli (sound or touch). Immobilization period was defined as the time from the moment the animal was unresponsive to external stimuli until the moment it began to respond to external sound or touch. Wolves were returned to the traps until fully recovered.

Statistical analyses of the physiologic parameters (cardiac rate, respiratory rate, and temperature) were compared during the times recorded (5, 15, and 25 min) for each individual. Statistical analyses were performed by analysis of variance for repeated measures and Tukey's test at a significance level of $P < 0.05$. Means are reported with standard deviations (SD). The mean dose and the seasonal response to drug were first evaluated by the statistical analyses of the physiologic parameters between sex and age classes, and between the pregnant ($n = 3$) and lactating ($n = 2$) groups and nonpregnant groups.

Twenty-four animals were classified as adults, with mean body weight of 27.28 ± 2.93 kg and three as subadults, with mean body weight of 20.0 ± 2.83 kg (Table 1). There were no differences in mean drug doses between sex or age classes or in seasonal response to drug doses, so animals of both sexes and all ages were combined for analysis. Three females captured were pregnant based on palpation and two were lactating, but no significant differences were found between the pregnant, lactating, and nonpregnant groups.

All animals appeared to be in good health and physical condition. The mean tiletamine–zolazepam dose (50 mg/ml) was 2.77 ± 0.56 mg/kg. Four adult wolves (two male and two female) required additional injections because they had lower doses to allow for continued handling. The average supplemental dose was 0.89 ± 0.06 mg/kg. Mean induction time was 7.33 ± 2.89 min (range = 3–15 min), and mean immobilization period was 48.56 ± 12.65 min. (range = 22–75 min) (Table 1).

Adverse effects associated with the induction of the anesthesia were exhibited in 13 of 27 wolves: 7 of 13 (55%) maned wolves exhibited compulsive licking, four (14%) exhibited excessive salivation, two (7%) had muscle twitching, one (4%) had muscle tremors, one (4%) exhibited tachypnea, and one (4%) exhibited bradycardia. Three of the 27 maned wolves (11%) had adverse effects during recovery: two (33%) presented muscle twitching, one (20%) presented pedal withdrawal reflex, one (20%) had muscle tremors, and one (20%) exhibited ataxia.

Table 2 illustrates the values of the physiologic parameters recorded 5, 15, and 25 min after drug administration. Heart rate had no significant differences ($P = 0.44$) during the times recorded. No significant differences were found in mean respiratory rate ($P = 0.82$) during induction time. The mean rectal temperatures had no significant differences during anesthesia ($P = 0.54$) and were very

Table 2. Means of physiologic parameters recorded at 5, 15, and 25 min following administration of a combination of tiletamine hydrochloride and zolazepam hydrochloride to free-ranging maned wolves in Emas National Park, central Brazil, from July 2001 through November 2003.

Physiologic parameters	5 min	15 min	25 min
Cardiac rate (beats/min)	146.15 ± 27.75	149.63 ± 24.76	151.74 ± 26.14
Respiratory rate (breaths/min)	41.77 ± 11.57	42.19 ± 15.28	40.50 ± 14.87
Temperature (°C)	38.27 ± 0.61	38.19 ± 0.64	38.29 ± 0.63

similar in the three measures time (range = 38.3–38.9°C ± 0.63).

The tiletamine–zolazepam combination appears to be an effective and safe drug for immobilizing free-ranging maned wolves and has been used for others canids such as gray wolves (*Canis lupus*),[4] Ethiopian wolves (*Canis simensis*),[9] wild dogs (*Lycaon pictus*),[3] and red foxes (*Vulpes vulpes*).[11] This combination permitted safe handling and successful completion of minor clinical procedures such as biological sample collection, as was realized during this study. The wolves captured were monitored by radiotelemetry after their release and their localizations were recorded twice in a week, confirming the safety protocol used. The drug combination seems safe for immobilizing pregnant and lactating wolves; two of the three pregnant females were later sighted with offspring.

Effective doses of the tiletamine–zolazepam combination used in this study were less than those recommended in the literature of 7.0 mg/kg and 10 mg/kg.[5,6] The lower dose provided good muscular relaxation and sufficient analgesia for management procedures, including marking and sampling with adequate handling time and minimal recovery time for field immobilizations. Preferably, the drug should be used at the lowest possible dose to ensure a relatively short recovery period. [2,3,11]

Physiologic measurements recorded did not indicate health risks. Increases in pulse rate during anesthesia were not found in this study, but have been reported in domestic dogs.[9] The dose used in this study was adequate for a field-handling period. Serious adverse effects were not seen during this study. Compulsive licking and excessive salivation are effects that may occur when dissociative anesthetic is used and have also been described in other species.[9,10] This study contributes to our knowledge base about chemical immobilization of free-ranging maned wolves and the protocol established can provide a safe capture for field data collection.

Acknowledgments: We thank Silvia R. G. Cortopassi for commenting on this manuscript, Natalia Mundim Torres for field assistance, Brazilian undergraduate students and Earthwatch volunteers for helping with field work and capturing maned wolves. We also appreciate the technical support from Centro Nacional de Pesquisa de Predadores Naturais–IBAMA and Parque Nacional das Emas for giving us permission to study in the Park. This study was financially supported by Fundo Nacional do Meio Ambiente and the Memphis Zoo.

LITERATURE CITED

1. Boever, W. J., J. Holden, and K. K. Kane. 1977. Use of Telazol (CI-744) for chemical restraint and anesthesia in wild and exotic carnivores. Vet. Med. Small Anim. Clin. 72: 1722–1725.

2. Evans, M., S. Atkinson, and A. Horsup. 1998. Combination of zolazepam and tiletamine as a sedative and anaesthetic for wombats. Austr. Vet. J. 76: 355–356.

3. Heerden, J. V., R. E. J. Burroughs, J. Dauth, and M. J. Dreyer. 1991. Immobilization of wild dogs (*Lycaon pictus*) with a tiletamine hydrochloride/zolazepam hydrochloride combination and subsequent evaluation of selected blood chemistry parameters. J. Wildl. Dis. 27: 225–229.

4. Kreeger, T. J., U. S. Seal, M. Callahan, and M. Beckel. 1990. Physiological and behavioral responses of gray wolves (*Canis lupus*) to immobilization with tiletamine and zolazepam. J. Wildl. Dis. 26: 90–94.

5. Mattos, P. S. R. 2003. Estudos de epidemiologia e genética populacional do lobo-guará (*Chrysocyon brachyurus*) na região nordeste do Estado de São Paulo. Ph.D. Dissertation. Univ. Federal de São Carlos, São Carlos, São Paulo, Brazil.

6. Nielsen, L. 1996. Chemical immobilization of free-ranging terrestrial mammals. *In:* Thurmon, J. C., W. J. Tranquilli, and G. J. Benson (eds.). Lumb & Jones' Veterinary Anesthesia. Williams & Wilkins, Baltimore, Maryland. Pp. 736–764.

7. Schobert, E. 1987. Telazol use in wild and exotic animals. Vet. Med. 82: 1080–1088.

8. Short, C. E. 1987. Dissociative anesthesia. *In:* Short, C. E. (ed.). Principles and Practice of Veterinary Anesthesia.Williams and Wilkins, Baltimore, Maryland. Pp. 158–169.

9. Sillero-Zubiri, C. 1996. Field immobilization of Ethiopian wolves (*Canis simensis*). J. Wildl. Dis. 32: 147–151.

10. Telesco, R. L., and M. S. Sovada. 2002. Immobilization of swift foxes with ketamine hydrochloride-xylazine hydrochloride. J. Wildl. Dis. 38: 764–768.

11. Travaini, A., and M. Delibes. 1994. Immobilization of free-ranging red foxes (*Vulpes vulpes*) with tiletamine hydrochloride and zolazepam hydrochloride. J. Wildl. Dis. 30: 589–591.

12. White, P. J., T. J. Kreeger, U. S. Seal, and J. R. Tester. 1991. Pathological responses of red foxes to capture in box traps. J. Wildl. Manage. 55: 78–80.

Received for publication 5 April 2005