Field Immobilization of Ethiopian Wolves (Canis simensis)

Author: Sillero-Zubiri, Claudio

Source: Journal of Wildlife Diseases, 32(1) : 147-151

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-32.1.147

Journal of Wildlife Diseases, 32(1), 1996, pp. 147–151

Field Immobilization of Ethiopian Wolves (*Canis simensis*)

Claudio Sillero-Zubiri, Wildlife Conservation Research Unit, Zoology Department, Oxford University, South Parks Road, Oxford OX1 3PS, United Kingdom

ABSTRACT: Telazol® (tiletamine hydrochloride and zolazepam hydrochloride combination) and a combination of ketamine hydrochloride and acepromazine were used to immobilize wild Ethiopian wolves (*Canis simensis*) in Ethiopia from 1988 to 1992. Telazol® doses of 2.1 to 6.5 mg/kg resulted in a mean (±SD) induction time of 2.3 ± 0.9 min and a mean (±SD) immobilization time of 82.2 ± 28.6 min. Induction time did not differ by dose, wolf weight, or age, but was significantly longer for females. Immobilization time differed with dose, but not by wolf weight, age, or sex. Total recovery times ranged from 50 to 158 min. There were no apparent side effects on immobilized animals. Wolves immobilized using a combination of ketamine hydrochloride and acetylpromazine had longer induction time (3.0 ± 0.8 min) and recovery time (114.7 ± 29.2 min). Telazol® is an effective and safe agent for immobilizing Ethiopian wolves and is preferred to ketamine/acetylpromazine.

Key words: Ethiopian wolf, *Canis simensis*, chemical immobilization, field capture, tiletamine hydrochloride, zolazepam hydrochloride, Telazol®, ketamine hydrochloride, acetylpromazine maleate.

A canid endemic to the Ethiopian highlands, the Ethiopian wolf, *Canis simensis*, is critically endangered and is the rarest canid in the world (≤500 adults; Gottelli and Sillero-Zubiri, 1992; Sillero-Zubiri and Gottelli, 1994). As part of a study of wild Ethiopian wolves in the Bale Mountains National Park, Ethiopia, animals were live-trapped and immobilized (Sillero-Zubiri and Gottelli, 1995a). Therefore a safe capture protocol and immobilizing drug was required if this protected species was to be handled. Here I report on the effectiveness of Telazol® and a ketamine/acetylpromazine combination to immobilize Ethiopian wolves, their ease of use in field conditions, and the effective doses.

Telazol® (A. H. Robins Co., Richmond, Virginia, USA) is a combination of tiletamine hydrochloride (HCl) and zolazepam HCl that has no reversal agent. Pharmacology of this drug has been described by Gray et al. (1974). Telazol® previously has been used to successfully immobilize several carnivore species, both in captivity and in the wild (Gray et al., 1974; Schobert, 1987). Ketamine HCl (Ketalar®, Parke-Davis, Morris Plains, New Jersey, USA) is a central-acting anesthetic and cataleptic similar to tiletamine HCl, and has been widely used on carnivores (Harthoorn, 1976). It was administered combined with the tranquilizer acetylpromazine maleate (Azepromazine®, Boots Pure Drugs, Nottingham, England).

Ethiopian wolves were captured for marking and radio-tagging between 1988 and 1992 in the Afroalpine heathlands of Bale Mountains National Park (7°00′N, 39°45′E; 3,000 to 4,300 m above sea level), situated in southern Ethiopia. The study area and field research are described by Gottelli and Sillero-Zubiri (1995a, b). Wolves were trapped using rubber-jawed leg-hold Soft-catch™ traps (No. 1½ and No. 3, Woodstream Corporation, Lititz, Pennsylvania, USA). Two to five traps were set concealed in a circle around a dead bait of locally-caught rodents or a small lamb and laced with long distance call lure 600 and coyote & wolf gland lure No. 100 (Stanley Hawbaker and Sons, Fort Loudon, Pennsylvania). Traps were checked every 2 hr. Ambient air temperatures during trapping ranged from −6 to 18 C. Trapped wolves were held under a blanket and anesthetized by hand-held intramuscular injection in the upper part of the hindquarters. A premixed powder, Telazol® was reconstituted using sterile water to 100 mg/ml (50 mg/ml of each drug). Ketamine was administered in a 50 mg/ml concentration, combined with acetylprom-

azine. Dose was based on visual assessment of body weight. Precise weight and consequent dose rates were calculated retrospectively. Wolves were handled at the capture site or, in poor weather, moved to the nearest shelter. Drug doses were set to obtain a level of anesthesia sufficient for handling. We then recorded body weight and measurements, marked individuals with numbered plastic ear-tags (Rototag, Henley, England), fitted radio-collars (Biotrack, Dorset, England), estimated age based on tooth wear (Sillero-Zubiri, 1994), and extracted a blood sample. Ophthalmic drops (Optrex, Boots, England) and a blindfold were applied to protect eyes from desiccation. Heart and respiration rates were monitored 1 to 5 min after induction, and rectal body temperature was measured with a rectal thermometer. After handling, wolves were left to recover unrestrained in a sheltered area, insulated from cold with a blanket, and observed from a distance of >200 m. Induction time was defined as the interval between injection and time when wolves did not respond to prodding. Handling time was the interval from induction to placing the animal at the recovery site. Recovery time was the interval after injection before wolves could stand and walk away from the recovery site. Analysis of covariance was used to analyze induction time and recovery time among different age and sex categories, and between the two different immobilizing agents; the drug dose (mg/kg) and wolf body weight were used as covariates (GLM) (Minitab Inc., 1991). Multiple regression analyses were used to assess factors which might affect induction and immobilization times, heart rate, respiration rate and body temperature after induction (Minitab Inc., 1991).

Forty-nine wolves were immobilized with a single dose of Telazol® (Table 1). There were no mortalities recorded; all animals handled were resighted following release. Mean (±SD) body weight of adult male and female wolves was 16.2 ± 1.3 kg (n = 18) and 12.8 ± 0.9 kg, (n = 8) respectively. Overall mean induction time (±SD) was 2.3 ± 0.9 min (range = 0.7 to 5 min) after doses averaging 3.6 ± 0.9 mg/kg (range = 2 to 6 mg/kg). Mean (±SD) immobilization time was 82.2 ± 28.6 min (range = 50 to 158 min) and mean (±SD) handling time was 38.3 ± 15.5 min (range = 14 to 78 min).

Induction time was independent of drug dose (P = 0.61), body weight (P = 0.57), and age class (P = 0.57), but was dependent on sex (P = 0.028), with females taking longer than males to react to the injection. Immobilization time varied with drug dose ($P < 0.001$), but not by body weight (P = 0.34), age (P = 0.19), or sex (P = 0.15). Neither heart rate ($\bar{x}$ = 190, SD = 25.4, range = 132 to 240, n = 43) nor respiration rate ($\bar{x}$ = 29.6, SD = 10.9, range = 16 to 68, n = 42) varied with drug dose, body weight, or age and sex class. Rectal temperatures 15 min after induction were mildly elevated ($\bar{x}$ = 38.6 C, SD = 0.9, range = 36.4 to 41.0 C, n = 41), and varied significantly with induction time (adjusted r^2 = 0.14, P = 0.009). Three adult wolves had hyperthermia (40 to 41 C); their temperatures dropped after dousing their fur with water. Hypothermia was noted in one juvenile; its temperature dropped to 36.4 C. The animal recovered normally after it was insulated with a blanket and rubbed. Occasional mouth and head movement (n = 8) and excessive salivation (n = 3) following induction were recorded. No other adverse behavioral responses were observed during immobilization.

Ten other wolves required an additional dose of Telazol®. Six of those did not achieve full anesthesia; four had been injected with significantly smaller doses of Telazol® (2.4 ± 0.6 mg/kg; t = 4.0, $P < 0.016$, df = 4), and for two animals some of the initial dose spilled out during injection. Four others required additional doses to extend immobilization time when handling was delayed. Overall, these 10 animals received significantly higher doses of Telazol® (4.9 ± 1.6 mg/kg; t = 2.42, $P <$

TABLE 1. Immobilization and handling of wild Ethiopian wolves in Bale Mountains National Park, Ethiopia, 1988 to 1992, after single intramuscular injections of Ketalar®/acepromazine and Telazol®.

	Number sampled	Weight (kg)		Drug dose (mg/kg)		Induction time (min)			Recovery time (min)			Body temperature (C)		
		Mean	SD	Mean	SD	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Telazol®														
Adult male[a]	9	15.8	1.0	3.8	0.8	2.3	0.9	1.3–3.8	94.4	32.6	60–158	39.0	1.2	37.2–40.7
Adult female	7	13.5	1.6	3.3	0.9	2.6	0.9	1.5–4.2	88.8	35.3	54–144	39.0	1.1	37.5–41.0
Subadult male	7	13.8	2.0	3.7	0.6	1.6	0.7	0.8–3.0	85.2	27.1	65–120	38.9	0.4	38.4–39.5
Subadult female	9	12.4	0.4	4.3	1.4	2.8	1.2	1.0–5.0	85.6	36.7	55–163	38.6	0.6	37.8–39.5
Juvenile male	9	10.0	1.7	3.1	0.6	2.0	0.6	1.2–3.1	69.3	14.1	50–88	38.1	1.0	36.4–39.0
Juvenile female	8	9.2	2.0	3.4	0.7	2.3	0.8	0.7–3.3	68.6	18.7	55–106	38.2	0.9	37.3–38.8
Total	49	12.4	2.7	3.6	0.9	2.3	0.9	0.7–5.0	82.2	28.6	50–158	38.6	1.0	36.4–41.0
Ketalar®/acepromazine														
Adult male	6	17.2	5.6	8.7	1.0	3.6	2.3	1.5–6.0	112.8	37.8	77–180	39.8	1.0	37.8–40.7
Adult female	1	13.7		10.9		1.7			100.0			39.6		
Subadult male	2	12.2		11.5		2.6		1.8–3.5	125.0		120–130	40.1		38.1–42.0
Subadult female	2	11.4		11.9		2.4		1.8–3.0	120.0			38.9		38.4–39.4
Total	11	14.9	2.9	10.0	1.8	3.0	1.8	1.0–8.0	114.7	29.2	77–180	39.7	1.2	37.8–42.0

[a] Adults >2 yr, subadults 1 to 2 yr, juveniles 5 to 11 mo old.

0.036, $df = 10$), were handled for a longer period (61 ± 19 min; $t = 3.46$, $P < 0.0053$, $df = 11$) and were immobilized longer (116 ± 25 min; $t = 3.74$, $P < 0.002$, $df = 15$) than those injected a single dose of Telazol®. Therefore they were excluded from the main analysis.

Eleven wolves were immobilized with a single dose of ketamine HCl and acetylpromazine. They received a mean (±SD) ketamine dose of 10.0 ± 0.8 mg/kg (range = 7 to 13 mg/kg), combined with 0.15 mg/kg of acetylpromazine. Mean (±SD) induction time was 3.0 ± 1.8 min (range = 1.5 to 8 min), mean (±SD) immobilization time was 114.7 ± 29.2 min (range = 77 to 180 min) and handling time (±SD) lasted 43.2 ± 12.8 min (range = 30 to 68 min). Head movements, muscle tremors and excessive salivation were recorded in six of the monitored wolves.

Induction time was somewhat longer for wolves immobilized with ketamine/acetylpromazine than with Telazol® ($P = 0.076$). Total recovery times were longer for ketamine/acetylpromazine ($P = 0.05$). Due to a lower concentration and larger dosage required, ketamine/acetylpromazine injections were of a larger volume than with Telazol® (2.9 ± 0.37 ml versus 0.44 ± 0.15 ml; $t = 16.6$, $P < 0.0001$, $df = 13$). Mean body temperature was higher for wolves immobilized with ketamine/acetylpromazine, with hyperthermia (>40 C) present in five of 11 wolves (vs three of 48 with Telazol®).

Telazol® appears to be an effective and safe drug for immobilizing Ethiopian wolves, similar to results for gray wolves (*Canis lupus*) (Ballard et al., 1991; Kreeger et al., 1990), and presumably other medium- to large-sized canids. Based on dose volume, induction and recovery times, and adverse side-effects (e.g hyperthermia) Telazol® seems superior to ketamine/acetylpromazine for immobilizing free-ranging canids.

A dose for Ethiopian wolves of approximately 3 to 4 mg/kg Telazol® resulted in a mean induction time of 2.3 min, with a recovery time of 80 to 90 min. These doses allowed 35 to 40 min of safe handling time, and should be acceptable for standard capture and handling procedures, including application of ear-tags and radio-collars and blood sampling. Reduced doses (2.0 to 2.5 mg/kg) may be acceptable in situations where handling will be minimal (<20 min) and full anesthesia is not required, such as rapid release from traps or radio-collar removal.

Advantages of this immobilizing agent include its preparation in powder form (convenient to store and carry and reconstituted to varying concentrations), small-volume dose requirements, lack of adverse side-effects during immobilization and recovery, and wide safety margins. Additional doses can be given if necessary. The principal disadvantages are the short shelf life once reconstituted, the relatively long recovery time, and lack of a reversing agent. We recommend leaving drugged animals in a quiet and sheltered place for recovery and observing them for 3 to 4 hr to reduce vulnerability to exposure and predatory attacks. Body temperature should be monitored closely.

This work was supported by NYZS/The Wildlife Conservation Society under the auspices of the IUCN Canid Specialist Group and the Ethiopian Wildlife Conservation Organisation. I am grateful to Dada Gottelli and Edriss Ebu for assistance in the field. I also thank Todd Fuller, Paul Johnson, and Sarah Wolfensohn for helpful comments in the manuscript.

LITERATURE CITED

BALLARD, W. B., L. A. AYRES, K. E. RONEY, AND T. H. SPRAKER. 1991. Immobilization of gray wolves (*Canis lupus*) with a combination of tiletamine hydrochloride and zolazepam hydrochloride. The Journal of Wildlife Management 55: 71–74.

GOTTELLI, D., AND C. SILLERO-ZUBIRI. 1992. The Ethiopian wolf—An endangered endemic canid. Oryx 26: 205–214.

GRAY, C. W., M. BUSH, AND C. C. BECK. 1974. Clinical experience using CI-744 in chemical restraint and anesthesia of exotic specimens. Journal of Zoo Animal Medicine 5: 12–21.

HARTHOORN, A. M. 1976. The chemical capture of animals. A guide to the chemical capture of wild and captive animals. Baillière Tindall, London, England, 416 pp.

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. Journal of Wildlife Diseases 29: 90–94.

MINITAB INC. 1991. Minitab Release 8.21 for DOS. Minitab Inc., State College, Pennsylvania, 200 pp.

SCHOBERT, E. 1987. Telazol use in wild and exotic animals. Veterinary Medicine 82: 1080–1088.

SILLERO-ZUBIRI, C. 1994. Behavioural ecology of the Ethiopian wolf, *Canis simensis*. D.Phil. Dissertation. Oxford University, Oxford, England, 283 pp.

———, AND D. GOTTELLI. 1994. *Canis simensis*. Mammalian Species 485: 1–6.

———, AND ———. 1995a. Diet and feeding behavior of Ethiopian wolves (*Canis simensis*). Journal of Mammalogy 76: 531–541.

———, AND ———. 1995b. Spatial organization in the Ethiopian wolf *Canis simensis:* Large packs and small stable home ranges. Journal of Zoology (London) 237: 65–81.

Received for publication 31 January 1995.