

Chemical restraint of Afghan mammals: a document for Afghan veterinarians

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Dr Stéphane Ostrowski
Afghanistan Ecosystem Health Project Manager, WCS
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The present document provides a selection of drug combinations suitable under most circumstances to achieve tranquilization and safe handling of Afghan wild mammals. It updates the document made available in February 2007 with the experience gained during the training course carried out at Kabul zoo in summer 2007 (Ostrowski, 2007).

Two drugs are usually combined and administered intramuscularly in the same syringe. Dosages are either extrapolated from those used for closely-related species and adjusted according to my personal field experience, or derived from Kreeger (1999). Although I believe they would be the best choice for artiodactyls, I did not include opiate derivatives (etorphine, fentanyl, carfentanil) as these drugs and their antagonists (diprenorphine, naloxone, naltrexone) are difficult to obtain and very dangerous to use. Table 1 proposes drug combinations for the chemical restraint of the most common wild mammal species in Afghanistan. Species are sorted by order, family and scientific name. When available (Habibi, 2003), common names in Dari and Pashto are specified. I also provide average body masses for adults, derived from the literature (Kreeger, 1999; McDonald, 2001) and from measurements I have made during field work in Western Asia. Table 2 gives intramuscular dosages of the ketamine–xylazine combination for rodents weighing less than 1 kg. It provides average values and more work is needed to adjust dosages to the large variety of Afghan rodent species.

If the recommended drugs can be antagonized, the appropriate antagonistic drug is mentioned and dosage is provided. Antagonists are given intramuscularly unless otherwise stated. If urgent recovery is required, antagonists can also be administered intravenously. One has then to evaluate the dangers of an immediate arousal of the animal.

I recommend reading the *Handbook of Wildlife Chemical Immobilization* (Kreeger, 1999) for further information on remote delivery procedures, precautions of use, drug side effects, and emergency procedures. Two copies are available for in-house consultation at the WCS main office, Ansari square St 3, right side, Shar e-Now, Kabul.

Literature cited

- Habibi, K. (2003). Mammals of Afghanistan. Zoo Outreach organization / U.S. Fish and Wildlife Service, Coimbatore, India. 168 pp.
- Kreeger, T. J. (1999). Handbook of Wildlife Chemical Immobilization, 3rd Edition. Wildlife Pharmaceuticals, Fort Collins, Colorado. 342 pp.
- Macdonald, D. W. (2001). The New Encyclopedia of Mammals. Oxford University Press, Oxford. 930 pp.
- Ostrowski, S. (2007). Immobilization, handling and vaccination of bird and mammal species at Kabul Zoo, June 2007. Unpublished report, WCS Afghanistan. 6 pp.

Table 1. Proposed drug combinations for chemical restraint of the most common species of wild mammals in Afghanistan

Order	Family	Scientific name	Common name	Name in Dari	Name in Pashto	Average adult body mass	Drugs (combinations and dosages)	Antagonists
Insectivora (insectivores)	Erinacidae (hedgehogs)	<i>Hemiechinus auritus</i>	Long-eared hedgehog	Khar pushtak gush daraz	Auzd gwazey jeshgey	0.2–0.5 kg	5 mg/kg ketamine + 0.2 mg/kg medetomidine	0.1 mg/kg atipamezole
		<i>Hemiechinus megalotis</i>	Afghan hedgehog	Khar pushtak afghani	Afghani jeshgey	?	5 mg/kg ketamine + 0.2 mg/kg medetomidine	0.1 mg/kg atipamezole
		<i>Paraechinus hypomelas</i>	Brandt's hedgehog	Khar pushtak kochak	Kuchney jeshgey	0.5–1 kg	5 mg/kg ketamine + 0.2 mg/kg medetomidine	0.1 mg/kg atipamezole
Chiroptera (bats)					<0.1 kg	10 mg/kg ketamine + 2 mg/kg xylazine	No reversal	
Primates (monkeys)	Cercopitheidae (old world monkeys)	<i>Macaca mulatta</i>	Rhesus monkey	Shadey	Bezow	5–8 kg	5 mg/kg Telazol/Zoletil*	No reversal
Carnivora (carnivores)	Felidae (cats)	<i>Caracal caracal</i>	Caracal	Peshak qarah kol	–	7–15 kg	6.5 mg/kg Telazol/Zoletil*	Not reported
		<i>Felis bengalensis</i>	Leopard cat	Peshak jangali	–	3–7 kg	6.6 mg/kg Telazol/Zoletil*	Not reported
		<i>Felis silvestris</i>	Wild cat	Peshak dashti	–	2–7 kg	10 mg/kg ketamine + 0.05 mg/kg medetomidine or 5 mg/kg Telazol/Zoletil*	0.3 mg/kg atipamezole ½ IV + ½ IM or all IM no reversal for Telazol/Zoletil**
		<i>Felis manul</i>	Pallas's cat	Peshak kohi	–	2–4 kg	8 mg/kg ketamine + 0.05 mg/kg medetomidine	0.3 mg/kg atipamezole ½ IV + ½ IM or all IM
		<i>Panthera pardus</i>	Leopard	Palang	Praang	35–60 kg	3 mg/kg ketamine + 0.07 mg/kg medetomidine or 3–4 mg/kg Telazol/Zoletil* + 0.05 mg/kg medetomidine	0.35 mg/kg atipamezole all IM no reversal for Telazol/Zoletil**
		<i>Uncia uncia</i>	Snow leopard	Palang barfie	Gharanie prang	25–75 kg	3 mg/kg ketamine + 0.08 mg/kg medetomidine or 4 mg/kg Telazol/Zoletil*	0.4 mg/kg atipamezole all IM no reversal for Telazol/Zoletil**
		<i>Canis lupus</i>	Wolf	Gurg	Leva/Shormos	15–40 kg	9–11 mg/kg ketamine + 1–2 mg/kg xylazine	0.15 mg/kg yohimbine or 0.2 mg/kg atipamezole
	Canidae (dogs)	<i>Canis aureus</i>	Jackal	Shegal	Chagal/Sor landai	7–15 kg	10 mg/kg Telazol/Zoletil**	Not reported

Carnivora (carnivores)	Canidae (dogs)	<i>Vulpes cana</i>	Blanford's fox	Robah khakey		1-1.5 kg	12 mg/kg ketamine + 0.05 mg/kg medetomidine or 10 mg/kg Telazol/Zoletil*	0.3 mg/kg atipamezole no reversal for Telazol/Zoletil**
		<i>Vulpes corsac</i>	Corsac fox	Robae karsak	-	2.5-5 kg	12 mg/kg ketamine + 0.05 mg/kg medetomidine or 10 mg/kg Telazol/Zoletil*	0.3 mg/kg atipamezole no reversal for Telazol/Zoletil**
		<i>Vulpes rueppellii</i>	Rüppell's fox	Robah dashty	-	1.2-2.6 kg	12 mg/kg ketamine + 0.05 mg/kg medetomidine or 10 mg/kg Telazol/Zoletil*	0.3 mg/kg atipamezole no reversal for Telazol/Zoletil**
	Hyaenidae (hyenas)	<i>Vulpes vulpes</i>	Red fox	Robae surkh	Srah geydarah	3-6.5 kg	12 mg/kg ketamine + 0.05 mg/kg medetomidine or 10 mg/kg Telazol/Zoletil*	0.3 mg/kg atipamezole no reversal for Telazol/Zoletil**
		<i>Hyena hyena</i>	Striped hyena	Kaftaar	Kozh	25-45 kg	5 mg/kg Telazol/Zoletil or 10 mg/kg ketamine + 1 mg/kg xylazine	no reversal for Telazol/Zoletil** 0.11 mg/kg yohimbine or 0.2 mg/kg atipamezole
		<i>Herpestes auropunctatus</i>	Small Indian mongoose	Mush khurma	Mush khurma	1.1-2.4 kg	4 mg/kg ketamine + 6.5 mg/kg xylazine	0.5 mg/kg atipamezole
	Mustelidae (mustelids)	<i>Lutra lutra</i>	Common otter	Sage abi	-	3-14 kg	50 mg/kg ketamine + 3 mg/kg xylazine	0.125 mg/kg yohimbine
		<i>Martes foina</i>	Stone marten	Dala khafaq	-	0.5-2 kg	4 mg/kg Telazol/Zoletil* + 3 mg/kg xylazine	Not reported
		<i>Mellivora capensis</i>	Ratel	Samur	-	3-6 kg	8 mg/kg ketamine + 0.5 mg/kg xylazine or 2.2 mg/kg Telazol/Zoletil*	0.3 mg/kg atipamezole no reversal for Telazol/Zoletil**
	Ursidae (bears)	<i>Mustela erminea</i>	Ermine	Mosh tazy	-	0.05-0.35 kg	5 mg/kg ketamine + 0.1 mg/kg medetomidine	0.5 mg/kg atipamezole
		<i>Mustela nivalis</i>	Weasel	Raasu	-	0.05-0.35 kg	5 mg/kg ketamine + 0.1 mg/kg medetomidine	0.5 mg/kg atipamezole
		<i>Ursus arctos</i>	Brown bear	Khers nasvary	Kher yezh	100-325 kg	8 mg/kg Telazol/Zoletil* or 2 mg/kg Telazol/Zoletil* + 0.06 mg/kg medetomidine or 11 mg/kg ketamine + 11 mg/kg xylazine	no reversal for Telazol/Zoletil** 0.3 mg/kg atipamezole 0.125 mg/kg yohimbine

Carnivora (carnivores)	Ursidae (bears)	<i>Ursus thibetanus</i>	Asiatic black bear	Khers siyah	Thour yezh	65-90 kg (f) 110-150 kg (m)	4-6 mg/kg Telazol/Zoletil* + 1 mg/kg ketamine + 0.5 mg/kg xylazine	no reversal for Telazol/Zoletil* 0.2 mg/kg atipamezole
Artiodactyla (artiodactyls)	Bovidae (bovids)	<i>Capra falconeri</i>	Markhor	Ahu markhur	Mar khura	32-40 kg (f) 80-110 kg (m)	1.7-2.3 mg/kg xylazine + 3.1-4.3 mg/kg ketamine	10-15 mg/animal atipamezole (2/3 IV + 1/3 IM)
		<i>Capra ibex</i>	Siberian ibex	Ahu rung	Mugley	30-50 kg (f) 80-100 kg (m)	1.7-2.3 mg/kg xylazine + 3.1-4.3 mg/kg ketamine	10-15 mg/animal atipamezole (2/3 IV + 1/3 IM)
Rodentia (rodents)	Suidae (pigs)	<i>Gazella subgutturosa</i>	Goitered gazelle	Ghazal	Oseye	15-25 kg	7 mg/kg ketamine + 8.5 mg/kg xylazine	0.05 mg/kg methoxy-odazoxan (RX821002A)
		<i>Ovis ammon polii</i>	Marco Polo's sheep	Ahu marco polo/qashqar	Marco polo gertsa	80-120 kg (m)	1.7-2.3 mg/kg xylazine + 3.1-4.3 mg/kg ketamine	10-15 mg/animal atipamezole (2/3 IV + 1/3 IM)
		<i>Ovis orientalis</i>	Urial sheep	Ahu nekhshyr/mel	Sra gertsa	36-87 kg (m)	1.7-2.3 mg/kg xylazine + 3.1-4.3 mg/kg ketamine	10-15 mg/animal atipamezole (2/3 IV + 1/3 IM)
		<i>Sus scrofa</i>	Wild boar	Khuge	Sarkuzy	50-200 kg	3 mg/kg Telazol/Zoletil* + 1.6 mg/kg xylazine	10-15 mg/animal atipamezole no reversal for Telazol/Zoletil**
		<i>Marmota caudata</i>	Long-tailed marmot	Vondok/Tabarghan	-	2.5-5 kg	3-10 mg/kg xylazine + 15-20 mg/kg Telazol/Zoletil*	1-2 mg/kg atipamezole no reversal for Telazol/Zoletil**
		<i>Hystrix indica</i>	Crested porcupine	Jarah	Skon	10-25 kg	7.5 mg/kg Telazol/Zoletil*	No reversal for Telazol/Zoletil**

*Brand denominations of Telazol® and Zoletil® are for US and Europe, respectively. They associate tiletamine and zolazepam chlorhydrates at equal mg/mg ratio. Thus 5 mg of Telazol/Zoletil represents 2.5 mg of tiletamine plus 2.5 mg of zolazepam.

**Benzodiazepine antagonists such as flumazenil or sarmazenil could partially antagonize Telazol® / Zoletil® effects but are very difficult to obtain at the moment in Afghanistan.

Table 2. Intramuscular dosages of ketamine-xylazine combination for rodents weighing less than 1 000 g. For animals weighing less than 250 g. a 10 to 20-fold dilution in sterile water of the ketamine-xylazine combination is required for a precise administration of the drugs.

Body mass (gram)	Dose xylazine (mg)	Dose ketamine (mg)	Sleep time (minute)
20	0.2-0.4	1-2	<1
50	0.4-0.8	2-3	<1
100	0.6-1	3-5	1.5-2
250	1-2	5-8	3-5
500	2-5	10-15	5-7
1000	3.3-6.5	16.5-25	10-15