Chemical restraint of Afghan mammals
A document for Afghan veterinarians

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The present document lists the most common wild mammal species encountered in Afghanistan and the drug combinations used for their clinical examination or for minor surgical procedures.

Species — Species are sorted by order, family and scientific name. When available, common names in Dari and Pashto are provided (*Mammals of Afghanistan*, Habibi, 2003).

Body mass — Average body masses are provided for adult specimens. They are derived from the literature (especially from the *Handbook of Wildlife Chemical immobilization*, Kreeger, 1999 and the *New Encyclopedia of Mammals*, McDonald, 2001) and from measurements I have made in Western Asia since 1996.

Drugs — Provided drugs are suitable under most circumstances to achieve tranquilization and safe handling of wild animals. Two drugs are usually combined for the chemical restraint of animals. They should be administered in the same syringe intramuscularly (IM)[1]. Dosages of drug combinations provided in Tables 1 and 2 are either derived from the *Handbook of Wildlife Chemical Immobilization* (Kreeger, 1999) or are extrapolated from dosages reported in the literature for close species and adjusted when necessary according to my personal field experience. Although I believe they would be the best choice for artiodactyls, I did not include opiate derivatives (etorphine, fentanyl, carfentanil) in the tables as these drugs and their antagonists (diprenorphine, naloxone, naltrexone) are difficult to obtain and are very dangerous to use. Table 1 summarizes proposed drug combinations for chemical restraint of the most common species of wild mammals in Afghanistan, while Table 2 focuses on intramuscular dosages of ketamine-xylazine combination for rodents weighing less than 1 kg. Table 2 provides average values, and several species may require much higher dosages. More work is needed to adjust dosages of this drug combination to the large variety of rodent species occurring in Afghanistan.

Antagonists — If the recommended drugs can be antagonized, the appropriate antagonistic drug is mentioned and dosage is provided. Antagonists are given intravenously (IV) unless otherwise stated.

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

[1] Tiletamine + zolazepam combination (Telazol, Zoletil) is sold as ready-to-use preparations.

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)	*Hemiechinus auritus*	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 IM
		Hemiechinus megalotis	Afghan hedgehog	Khar pushtak afghany	Afghani jeshgey	?	5 mg/kg ketamine + 0.2 mg/kg medetomidine	0.1 mg/kg atipamezole IM
		Paraechinus hypomelas	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 IM
Chiroptera (bats)						<0.1 kg	10 mg/kg ketamine + 2 mg/kg xylazine	No reversal
Primates	Cercopithecidae (old world monkeys)	*Macaca mullata*	Rhesus monkey	Shadey	Bezow	5–8 kg	5 mg/kg Telazol/Zoletil*	No reversal
Carnivora (carnivores)	Felidae (cats)	*Caracal caracal*	Caracal	Peshak qarah kol	–	7–15 kg	6.5 mg/kg Telazol/Zoletil*	Not reported
		Felis bengalensis	Leopard cat	Peshak jangali	–	3–7 kg	6.6 mg/kg Telazol/Zoletil*	Not reported
		Felis silvestris	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)
		Felis manul	Pallas's cat	Peshak kohi	–	2–5 kg	8 mg/kg ketamine + 0.05 mg/kg medetomidine	0.3 mg/kg atipamezole ½ IV + ½ IM or all IM
		Panthera pardus	Leopard	Palang	Praang	35–60 kg	3 mg/kg ketamine + 0.07 mg/kg medetomidine or 6 mg/kg Telazol/Zoletil*	0.35 mg/kg atipamezole ½ IV + ½ IM no reversal for Telazol/Zoletil)
		Uncia uncia	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 ½ IV + ½ IM no reversal for Telazol/Zoletil)
	Canidae (dogs)	*Canis lupus*	Wolf	Gurg	Leva/Shormos	15–35 kg	10 mg/kg ketamine + 2 mg/kg xylazine	0.15 mg/kg yohimbine or 0.2 mg/kg atipamezole
		Canis aureus	Jackal	Shagal	Chagal/Sor landai	7–15 kg	10 mg/kg Telazol/Zoletil**	Not reported

Carnivora (carnivores)	Canidae (dogs)	*Vulpes cana*	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*
		Vulpes corsac	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*
		Vulpes rueppelii	Sand 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*
		Vulpes vulpes	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*
	Hynaenidae (hyenas)	*Hyena hyena*	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
	Herpestidae (mongooses)	*Herpestes auropunctatus*	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 IM
	Mustelidae (mustelids)	*Lutra lutra*	Common otter	Sage abi	–	3–14 kg	50 mg/kg ketamine + 3 mg/kg xylazine	0.125 mg/kg yohimbine
		Martes foina	Stone marten	Dala khafaq	–	0.5–2 kg	4 mg/kg Telazol/Zoletil l* + 3 mg/kg xylazine	Not reported
		Mellivora capensis	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*
		Mustela erminea	Ermine	Mosh tazy	–	0.05–0.35 kg	5 mg/kg ketamine + 0.1 mg/kg medetomidine	0.5 mg/kg atipamezole IM
		Mustela nivalis	Weasel	Raasu	–	0.05–0.35 kg	5 mg/kg ketamine + 0.1 mg/kg medetomidine	0.5 mg/kg atipamezole IM
	Ursidae (bears)	*Ursus arctos*	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
		Ursus thibetanus	Asiatic black bear	Khers siyah	Thour yezh	65–90 kg (f) 110–150 kg (m)	4.4 mg/kg Telazol/Zoletil*	No reversal

Artiodactyla (artiodactyls)	Bovidae (bovids)	*Capra falconeri*	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)
		Capra ibex	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)
		Gazella subgutturosa	Goitered gazelle	Ghazal	Oseye	15–25 kg	7 mg/kg ketamine + 8.5 mg/kg xylazine	0.05 mg/kg methoxy–odazoxan (RX821002A)
		Ovis ammon polii	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)
		Ovis orientalis	Urial sheep	Ahu nekhsheyr/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)
	Suidae (pigs)	*Sus scrofa*	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*
Rodentia (rodents)	Sciuridae	*Marmota caudata*	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*
	Hystricidae (porcupines)	*Hystrix indica*	Crested porcupine	Jarah	Skon	10–25 kg	7.5 mg/kg Telazol/Zoletil*	No reversal

*Brand denominations of Telazol™ and Zoletil™ are for US and Europe, respectively. It is an association of 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.

Table 2 — Intramuscular dosages of ketamine-xylazine combination for rodents weighing less than 1000 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