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were being, offered for sale with little risk. Delays in implementing the new 1992 Act demonstrated that proper enforcement was not a high priority for the government.

The report said that between November 1994 and March 1996, over 24,000 pieces of tiger bone, medicines and claw and tooth pendants had been seized by the Canadian authorities at the border. Pointing out that only 6-7 of 32 wildlife enforcement officers worked full-time on enforcing CITES, and that Customs offices had little or no training in the identification of wildlife products, the report went on: "If this untrained, skeletal staff has

managed to effect the seizure of over 24,000 tiger items in just over one year, we should be very concerned about the volume of tiger products entering the country undetected."

The report said that sometimes items and medicines were re-exported to other countries. US records showed 157 packages of tiger derivatives were imported from Canada between 1987 and 1990, 85 of which were seized.

It was noted that China reported exporting 1,193 shipping containers of tiger products to Canada between 1990 and 1992, but Canada had no record of the shipments.

Medetomidine and Rubber-padded Leg-hold Traps in Venezuelan Cat Studies

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As part of an ongoing research project on predation problems of jaguar and puma on beef cattle, felids were captured for measuring, sampling and radio-collaring at Hato Piñero, Cojedes State, Central Llanos of Venezuela. In the initial stage of this project, five felids were captured: one adult male jaguar (*Panthera onca*), one adult female jaguar, one adult female puma (*Puma concolor*) and two female ocelots (*Leopardus pardalis*). Chasing with dogs was not used as a capture method due to high ambient temperatures (38-42° C) before midday, because the chase, in combination with the anaesthetic would increase the risk of an elevated body temperature in the tranquilized felid. Instead we used rubber-padded leg-hold traps (The Livestock Protection Co., Alpine Texas). This method had the additional advantages that it allowed having all the veterinary gear near the tranquilized felid, and avoided the danger involved for the felids, dogs and researchers.

For the immobilization we used a combination of the central alpha₂ adrenoceptor agonist, Medetomidine, in combination with the dissociative anaesthetic, Ketamine hydrochloride, delivered with a Telinject air-compressed blowpipe. This drug combination was chosen because of the excellent reports in the literature (zoos and/or captive conditions) which indicated better anaesthesia of carnivores than the commonly used Xylazine-Ketamine combination. Also Medetomidine has the additional advantage of the possible use of a reversing agent (Atipamezole, an alpha₂ adrenoceptor antagonist) that can be injected immediately after procedures (Jalanka, 1989a, 1989b; Barnett & Lewis, 1990; Jalanka & Roeken, 1990; Swan, 1993). Since this was the first time that the tranquilizer Medetomidine had been used in free-ranging felids, we felt it was important to report our findings.

Rubber-padded leg-hold traps were set along trails used by cats and near streams and lagoons. They were also set in small openings left at one side of stick enclosures containing pigs or goats as baits, or around recently consumed prey items. All leg-hold traps were checked early in the morning. Animals captured were cautiously and silently approached, weight was visually estimated, and a syringe dart with the drug combination was prepared. The doses utilized for the estimated weights were: Medetomidine (concentration 10 mg/ml, 10 ml vial): 50 mg/kg, Ketamine (concentration 200 mg/ml, 20 ml vial): 2 mg/kg. Doses were so small that the 1 ml syringe had to be completed with distilled water. Medetomidine, Ketamine and Atipamezole were kindly donated to the project for experimental use by Orion Corporation and Wildlife Pharmaceuticals.

After the felid was tranquilized, the foot was taken out of the trap, and the animal was brought to a shaded area, where it was

examined, treated, measured, weighed, radio-collared, and blood, feces and hair samples taken. Additional treatment included the injection of a long-acting antibiotic, Ivermectin (to prevent screw worm infections, which are very common in the Llanos), Ringer-Lactate solution (1-2 liters in the big cats to prevent dehydration after fighting the trap), ophthalmic ointment (to protect the eyes, which were also covered with a clean dark cloth), betadine and a larvicidal spray (to treat any small wound or scratch on the skin).

Atipamezole (concentration 5 mg/ml, 10 ml vial), was injected when the handling of the animal was finished, or when it showed signs of spontaneous recovery, at a dose three times higher (150 mg/kg) than the Medetomidine dose previously used (50 mg/kg).

The species of felid immobilized, sex, estimated age, actual weight, the doses of Medetomidine, Ketamine and Atipamezole they received in relation to their weight, the induction time (interval between injection and recumbency or first handling), the duration of handling (interval between first handling until spontaneous recovery or until the antagonist was administered), and the type of recovery (spontaneous or Atipamezole induced) are shown in the Table.

The Medetomidine and Ketamine combination given in a single dart, rapidly induced a calm and complete immobilization, characterized by stable heart and respiratory rates, stable rectal temperatures, good mucous membrane color, and good myorelaxation in all felids treated. The intramuscular injection of the reversing agent, Atipamezole, resulted in calm and uneventful recoveries. Some animals recovered spontaneously, in approximately one hour after darting. No side effects such as vomiting, overheating (in this very hot climate) or jerking of the limb muscles were noted in any of the tranquilized animals - even in the case of large or small doses. No deaths during or after the immobilization occurred. Dart volumes were very small. All animals were successfully radio-tracked for at least four months after being immobilized.

One recommendation arising from this experience with free-ranging felids is the use of a slightly higher dose of Medetomidine (60-70 mg/kg) than the dosage utilized in zoo conditions (50 mg/kg), in this combination with 2 mg/kg of Ketamine. Many of the tranquilized felids recovered spontaneously and too soon, and this can be inconvenient. This recommendation also takes into account the high security margin shown by this tranquilizing agent. We used up to 184 mg/kg for one ocelot, and 87 mg/kg for one jaguar, with no complications. Other authors report very high doses of Medetomidine and Medetomidine-Ketamine combinations, administered to pregnant animals, or animals that had to be

euthanized, because of medical or management reasons, without any signs of adverse effects related to the immobilization (Jalanka & Roeken, 1990).

One possible disadvantage of Medetomidine is its relatively high cost. Originally we also thought of using the cheaper Tylazol-Ketamine combination, successfully utilized in the immobilization of wild jaguars (summarized in Hoogsteijn & Mondolfi, 1993; see also Crawshaw, 1992, 1995). It has the disadvantage that after the Tylazol solution has been reconstituted, its shelf-life

is very short (two weeks), and the doses are much larger, so the final price (per tranquilized animal) is probably higher after immobilizing many carnivores over a shorter or longer period of time in a research project or a zoo situation.

With all these advantages, an increased use of the Medetomidine-Ketamine combination and the reversal with Atipamezole in the immobilization, capture and sedation of wild carnivores should be anticipated.

Table – Data on the Immobilization of Wild Felids in the Central Llanos of Venezuela

Felid Species Sex	Puma Female	Jaguar Female	Jaguar Male	Ocelot Female	Ocelot Male
Estimated age (years)	10-12	4-5	19-20	2	12
Actual weight (kg)	42	46	82	5.4	7
Medetomidine dosis (μ g/kg)	48	87	36	184	43
Ketamine dosis (mg/kg)	1.9	3.48	1.46	3.7	7.7
Induction time (min)	4	3	2	3	5
Handling duration (min)	61	130	63	52	82
Atipamezole dosis (μ g/kg)	119	163	122	551	128
Recovery	Spont.	Induced	Spont.	Induced	Induced
Date (1996)	21 Feb	13 Mar	22 Mar	14 Mar	18 Mar

Induction time = Time interval between injection and recumbency or first handling
Handling duration = Time interval between the animal being first handled until spontaneous recovery or until the antagonist was administered

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