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Tranquilizer Use In Wildlife Damage Control

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ABSTRACT: Acceptable handling of problem or nuisance animals has been a concern of the general public and many local, state, and federal agencies. In the past, handling of these animals involved physical restraining techniques. These techniques exposed not only the "restrainer" but the "restrainee" to potential physical damage. Equipment utilizing Sucostrin as the immobilizing agent was developed to minimize these hazards.

In the state of Iowa, handling of wild animals has been an extremely time consuming activity especially for officers in urban areas. Until recently the only tools available were gloves, rope, and intestinal fortitude. Often an officer was bitten, scratched or kicked; the animals also suffered from stress, were occasionally injured and perhaps unintentionally killed. Better and safer methods were needed. We had watched enough TV to note that tranquilizer guns coupled with time lapse photography looked very impressive. Tranquilizer guns, however, were relatively expensive and providing each officer with one of these guns would be budgetarily prohibitive. The public may also be justifiably concerned when a person carries a firearm of any kind into one's house or onto a school yard. A silent unintrusive, practical instrument was needed to deliver a relatively safe, quick acting and inexpensive immobilizer.

The immobilizer selected was Sucostrin (Succinylcholine chloride). Sucostrin was selected for several reasons:

1. Relatively safe for human handling, especially at the levels used for immobilizing wildlife
2. Commercial availability in various strengths
3. Inexpensive
4. Fast acting
5. Only small amount needed
6. Good shelf life
7. Its veterinary success on horses

One must, however, take into account that Sucostrin does have its shortcomings. Sucostrin is not a tranquilizer, but a muscle blocking agent--it essentially paralyzes the animal. These paralyzed animals are fully awake, aware, can feel pain, and are subject to stress.

Sucostrin tolerances vary between species. For example, a dosage twice that necessary may just put a dog down longer and faster but would most likely kill a deer. This drug should not be used for euthanasia. Accepted drugs for euthanasia include: Beuthanasia, Euthanol, Biocide, and saturated solutions of potassium chloride and magnesium sulphate. Only when the animal is euthanized with the saturated salt solutions is the carcass considered edible.

Two methods of delivery were developed to introduce the drug. The first was a mere extension of the syringe which allowed keeping precious parts of one's anatomy at a safer distance. We called it a "jab pole" because of the

method used to inject the drug. When dealing with small nuisance urban wildlife, one can frequently get within 10 to 15 feet, but not close enough to use a "ketch pole". Often they are in garages or attics and occasionally near electrical wiring.

We needed an instrument that would fit in a vehicle, be safe around electrical wiring and long enough to keep from being sprayed by a skunk (Mephitis mephitis). Skunks can reportedly spray 8 to 10 feet. A modified 16 foot telescoping fiberglass fishing pole filled all these criteria.

The tip section was removed and discarded (or saved for ice fishing) and a small 1/32 inch hole was drilled approximately 3¼ to 3½ inches from the tip of the second section (the new tip section). A 1 cc syringe was then modified by trimming the tail section until it fit inside the tip of this fiberglass pole. The modified rear section of the syringe plunger was inserted into a 2 inch section of ¼ inch OD Tygon tubing. The syringe unit was inserted into the opening at the pole tip and secured by running a pin through the drilled holes and the Tygon tubing (Figure 1).

The instrument was used with a 1 cc syringe because we found it difficult to administer larger dosages. Larger syringes can be used providing that the pole tip becomes part of the plunger. Even when using a 1 cc syringe, a large 1 inch needle (18-16 ga) was used to allow the drug to pass from the syringe to the muscle quickly. For skunks we found that a 20 gauge needle may be better from a potential response point of view (less shock for skunk to respond to). Our luck with skunks has been very good -- no released scent yet.

We found the most effective technique for handling the jab pole was to approach the animal slowly and then when the syringe was near the intended injection site, quickly, and forcefully thrust the needle into muscle and continue pressure until the drug was administered. This should be done in one totally smooth motion.

The second method used the blow-gun and here the syringe was actually a projectile. The syringe that had been modified for the jab pole should also fit the blow-gun. Further modifications, however, were needed. One first needed to drill a 1/32 inch hole approximately ½ inch deep in the center of the rear end of the plunger. Secondly, drill a 1/32 inch hole through the top of the syringe barrel approximately ¼ inch from the top. Then drill three holes in the plunger through the hole in the syringe barrel in positions where the base of the plunger is at 1/8, 1/4 and 1/2 cc. Two #32 talced rubber bands, an appropriate pin in the tail piece and a piece of thin mechanical pencil lead inserted into the hole in the syringe barrel and through one of the holes in the plunger corresponding to the desired injection volume and broken off flush with the syringe barrel completed the blow-gun dart (Figure 2). A 4½ foot blow-gun was used to propell the syringe. Upon impact the pencil lead was sheared allowing the rubber bands to deliver the drug.

A blow-gun can be used to deliver a dart to an animal in close confinement. In a situation where a jab pole was not practical and capture pistol or rifle not available, a blow-gun could be used. The practical range may be only 15 yards or less. Practice was the key to successful blow-gun use. With our blow-gun, drug volumes of ½ cc or less were normally delivered by this method.

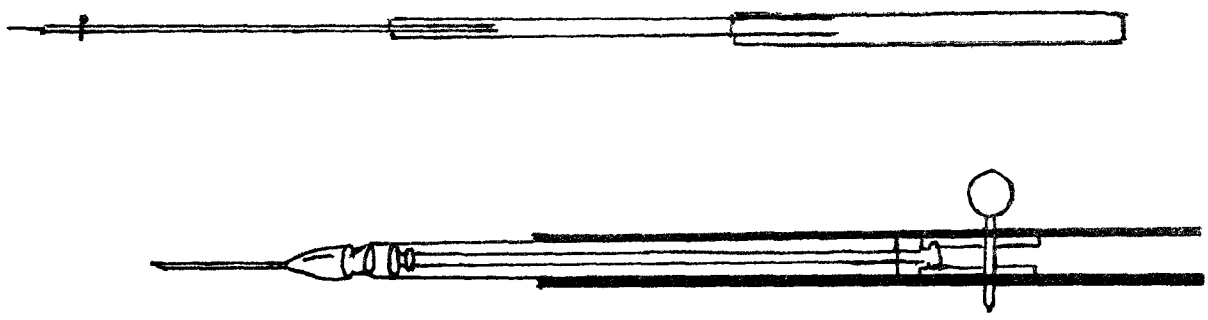

Figure 1. Diagram of 12 foot jab pole setup (Top - jab pole; Bottom - expanded diagram of the tip section).

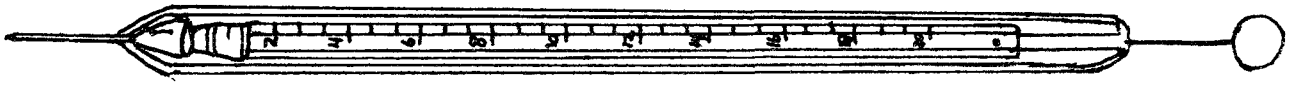

Figure 2. Diagram of a blow-gun projectile (syringe).

In Iowa alone over a thousand animals have been handled using Sucostrin administered by either the jab pole or blow-gun dart. Data were recorded for each animal. Pertinent data including date, species, condition of the animal, amount of injection, reaction time and down time were recorded for each animal on special data sheets. Deaths through use of this drug have been minimal. When using Sucostrin or other drugs always keep in mind that reactions can vary depending on physical and mental condition of the animal. For example, a stressed animal may require more drug than a "tranquil" animal, or a healthy animal more than an emaciated or sick one. Injections should ideally be in a large muscle mass so location of hit is important. Injections into fat, bone or stomach instead of tissue will probably be ineffective. Ineffectiveness may also be the result with poor injections or with drug-tolerant animals. With Sucostrin an overdose must always be considered a possibility, so artificial resuscitation may be necessary and has been proven effective. Tables for suggested dosages on wildlife or Sucostrin and Ketaset (Ketamine hydrocholoride) are presented in Appendices I and II respectively.

The following are case examples of Sucostrin (20 mg/ml) being used on wild animals:

1/4 grown coyote (Canis latrans) pup was injected with 1/4 cc (0.8 mg) of 5 parts water and 1 part Sucostrin and was down in two minutes and recovered in 40 minutes.

Full grown opossum (Didelphis marsupialus) was injected with 1/4 cc (0.8 mg) of 5 parts water and 1 part Sucostrin and was down in 1 minute and recovered in 16 minutes.

1/8 cc (0.6 mg) for 1/4 grown raccoon (Procyon lotor) produced handleability in approximately 60 seconds with recovery in 30 to 60 minutes (using 3 to 1 mix). 1/4 cc (1.25 mg) for 1/2 grown and full grown raccoon about the same results (using 3 to 1 mix).

Reactions vary and the eye can serve as an indicator; it would roll back (white showing) after injection (sometimes from 3 to 8 minutes). When the eye returned to normal the animal was coming around, but it could be handled yet for sometime.

Research is currently being conducted to produce a dart utilizing powdered Sucostrin which can be projected through an officer's service revolver. This along with the jab pole and blow-gun should provide an officer with a wide array of injection methods.

Sucostrin can be a very good tool if properly handled and used. More research is necessary if we are to determine optimum dosages for a larger number of wildlife species. The jab pole and blow-gun do provide a much better method of handling animals than the old bare-handed--grit your teeth--methods of the past.

LITERATURE CITED

CLARK, W., D.A. JESSUP, and H. ADAMS. 1979. Animal restraint handbook, California Department of Fish and Game, Wildlife Investigations Laboratory, 987 Jedsmith Drive, Sacramento, CA 95819. 97 pp.

APPENDIX I

SUCOSTRIN

TABLE I. Recommended dosages using Sucostrin 20 mg/ml*.

Animal	Size	Mix (Water to Sucostrin)	Amount to use Volume cc	mg Active Ingredient in Suggested Dose
Raccoon	Half to full	3 to 1	1/4	1.25
Procyon lotor	¼ to ½	3 to 1	1/8	0.6
Fox	Half to full	2 to 1	1/4	1.7
Vulpes vulpes	¼ to ½	5 to 1	1/4	0.8
Coyote	Half to full	2 to 1	1/4	1.7
Canis latrans	¼ to ½	5 to 1	1/4	0.8
Ground Hog	Half to full	Straight	1/4	5.0
Marmota monax	¼ to ½	Straight	1/8	2.5
Badger	Half to full	Straight	1/4	5.0
Taxidea taxus	¼ to ½	Straight	1/8	2.5
Deer	Full	Straight	0.3-0.4	6 to 8
Odocoileus virginianus				
Opossum	Full	3 to 1	1/4	1.25
Didelphis marsupialus				
Redtailed Hawk	Half to full	5 to 1	1/8	0.4
Buteo jamaciensis				
Great Horned Owl	Lg full	5 to 1	1/8	0.4
Bubo virginianus				

*Nebraska uses powdered succinylcholine chloride instead of the commercially available Sucostrin (20 mg/ml or 100 mg/ml). Twenty mg of the powdered succinylcholine chloride is placed into hand-calibrated plastic film containers. Before use, one just adds enough sterile water to make up the desired dilution. Solutions are prepared fresh before each use, and excess chemical is discarded.

APPENDIX II

KETAMINE HYDROCHLORIDE (KETASET)

Ketamine hydrochloride can also be used as a tranquilizer (Clark et al. 1979). Dosages are not as critical or as hazardous as Sucostrin can be. Ketamine can be used on mammals, birds and reptiles (Table II).

TABLE II. Recommended dosages for using Ketamine (100 mg/ml).

Species	Recommended Dosages	Weight Range Adult	100 mg/ml Avg. Adult Dosage	Half Grown Dosage	Quarter Grown Dosage
Beaver	5-10 mg/lb.	30 - 60 lbs.	3.5 cc	1.75 cc	0.76 cc
Bobcat	10 mg/lb.	15 - 35 lbs.	2.5 cc	1.25 cc	0.60 cc
Cat	5-20 mg/lb.	4 - 10 lbs.	0.9 cc	0.5 cc	0.25 cc
Coyote	5-11 mg/lb.	20 - 50 lbs.	2.8 cc	1.4 cc	0.7 cc
Dog	5-11 mg/lb.				
Gray Fox	5-11 mg/lb.	7 - 13 lbs.	0.7 cc	0.35 cc	0.2 cc
Red Fox	5-11 mg/lb.	10 - 15 lbs.	1.0 cc	0.5 cc	0.25 cc
Mink	2-10 mg/lb.	1.25 - 3 lbs.	0.2 cc	0.1 cc	0.05 cc
Muskrat	*50-100 mg/lb.	2 - 4 lbs.	2.0 cc	1.0 cc	0.5 cc
Opossum	5-10 mg/lb.	9 - 13 lbs.	0.9 cc	0.5 cc	0.25 cc
Raccoon	2-8 mg/lb.	12 - 35 lbs.	1.1 cc	0.5 cc	0.25 cc
Skunk	5-10 mg/lb.	6 - 14 lbs.	0.8 cc	0.4 cc	0.2 cc
Snakes	20-30 mg/lb.				
Turtles	10-50 mg/lb.				
Birds	2-12 mg/lb.				

*Estimated dosage