



# Wildlife Anesthesia

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## Problems inherent in field anesthesia

- ❖ Environmental obstacles: Mountainous terrain, thick forest, swamp etc. can pose a problem as animals can be difficult to track, or may become anesthetized in an area where the animal is hard to reach.
- ❖ Lack of supportive equipment: Anesthesia in a controlled environment requires equipment to supply oxygen, support ventilation, blood pressure etc. This equipment is not available in the field, increasing the risk of complications in the animal
- ❖ Weather conditions: Many of the anesthetic agents will impair the animals ability to control its body temperature. Animals tend to become hyperthermic in a hot environment, and can become hypothermic with prolonged exposure to the cold.
- ❖ Predators: Sleeping animals left unattended are prone to predation.
- ❖ Injection site: Drug injection site can influence absorption of the drug and time to induction of anesthesia. For most species the best site is the gluteal muscle mass (hindquarters) or the muscles on the back of the hindlimb.

## Monitoring anesthesia

Anesthetized animals need to be monitored. Monitoring anesthesia will enable the anesthetist to determine if the animal is having complications that require treatment, or if the animal is waking up from anesthesia. We usually monitor reflexes, and difference in reflexes can be seen with different agents. The specific reflexes will be discussed under the specific agents.

- ❖ Palpebral reflex: The eyelid is gently touched. Animals under a light plane of anesthesia will blink in response to the touch.
- ❖ Nystagmus: The eye flicks rapidly from side to side. With xylazine-ketamine, and medetomidine-ketamine this is a sign that the animal is waking up and requires additional drugs.
- ❖ Movement: Movement of the limbs or the head and neck often indicates that the animal is waking up and additional drugs will be required.
- ❖ Heart rate: Normal heart rate varies between species and drugs administered. The heart can be auscultated with a stethoscope, or a pulse can be palpated. A good pulse for most species is the femoral arterial pulse which is located on the inside of the hind leg close to the abdomen.
- ❖ Respiratory rate: This will vary between species and is usually monitored by observing chest movement. As animals start to wake up they will often develop a rapid respiratory rate.
- ❖ Body temperature: Usually monitored with a rectal thermometer. A temperature over 41 Celsius is cause for concern and the animal should be cooled if possible.
- ❖ Mucous membrane color: The mucous membranes should always be pink. White membranes can indicate shock and blue or purple mucous membranes indicate a lack of oxygen.



## **Drugs used for wildlife immobilization**

The Ideal Drug: if a drug could be invented that would be ideal for wildlife immobilization it would probably have the following properties:

1. High therapeutic index: The drug should be very safe for the animal, with minimal side effects.
2. Rapid absorption and rapid induction: The animal should be immobilized quickly to avoid losing the animal.
3. Small volume: Small darts are more accurate and less traumatic. With very large animals, potent drugs are required to avoid large dart volumes.
4. Specific antagonist: The antagonist should rapidly, fully reverse the adverse effects of the immobilizing agent and should outlast the effects of the agent.
5. Solution stability: It is common to be working in adverse conditions; therefore, the solution should be stable at a wide range of temperatures.
6. Handler Safety: The drug should be safe enough that small volumes cause no problem, and it should be possible to fully antagonize the effects of the drug.

## **ANESTHESIA OF WILD RUMINANTS**

### Special considerations for ruminants

1. Bloat: Bacterial fermentation of ingesta results in gas formation in the rumen. If rumen motility is decreased gas can build up in the rumen resulting in ruminal tympany (bloat).
2. If bloat is severe it can impair breathing and blood flow, resulting in hypoxemia and shock. Bloat may be relieved by passage of a stomach tube or rumen trocharization.
3. Regurgitation: Anesthetized ruminants are prone to regurgitation, particularly if bloat occurs. If the airway is not protected there is a risk of aspiration pneumonia.
4. Hypoxemia: Ruminants are prone to hypoxemia during anesthesia. Oxygenation should be monitored if possible.
5. Position: It is preferable to maintain ruminants in sternal recumbency if possible. This is the best position for oxygenation, and it decreases the risk of bloat.
6. Myopathy: Ruminants are at high risk for the development of myopathy. Pursuit should be limited to 5 minutes maximum.
7. Hyperthermia: Ruminants are at risk for hyperthermia. Immobilization should be avoided during the warm hours of the day if possible.
8. Trauma: Care must be taken during induction. Many of the smaller ruminants are very flighty and may traumatize themselves during induction of anesthesia.

### **Anesthetic considerations for specific ruminants**

#### **❖ White-tailed Deer & Mule Deer:**

These two species are quite similar in their response to anesthetic. Care must be taken during induction as they are flighty. Care must be taken during dart placement as darts can severely traumatize smaller animals. Usually dose does at 50-75 kg, and bucks at 75-125 kg.

Combinations:

Xylazine 2 mg/kg + Ketamine 3-4 mg/kg.

Reversal: Yohimbine 0.1-0.2 mg/kg.



Carfentanil 10 ug/kg + Xylazine 0.3 mg/kg.

Reversal: Naltrexone 1 mg/kg.

Medetomidine 100 ug/kg + Ketamine 2.5 mg/kg.

Reversal: Atipamezole 400 ug/kg.

#### ❖ **Bison:**

Very difficult to immobilize. Prone to regurgitation, bloat, and hypoxemia. The only reliable combination is carfentanil+xylazine. Can see pronounced excitement and pacing on induction of anesthesia. Animals are dangerous to approach at this time and should always be approached with extreme caution even if they appear to be deeply anesthetized. Adult males dosed at 800-1000 kg. Females 600-800 kg.

Carfentanil 7ug/kg + xylazine 0.05-0.1 mg/kg.

Reversal: Naltrexone 0.8 mg/kg.

Telazol 3-4 mg/kg

### **ANESTHESIA OF URSIDS, CANIDS, AND FELIDS**

#### ❖ **Ursids**

Black bears: Several problems can be encountered in this species. Black bears are often immobilized in trees. There is the possibility of injury when the bear falls out of the tree. Black bears demonstrate considerable variability in body weight, which can lead to problems in determination of drug dosages. Sudden recoveries have been encountered in black bears with various drug protocols. Care must always be taken when anesthetized animals are approached as they may appear deeply anesthetized but can become aroused when approached.

Combinations

Xylazine 2-3 mg/kg + Ketamine 6-10 mg/kg. Reversal Yohimbine 0.2 mg/kg

Telazol 4 mg/kg

Medetomidine 100 ug/kg + Ketamine 4 mg/kg. Reversal

Atipamezole 400 ug/kg.

#### ❖ **Canids**

Timber wolf: Canids can demonstrate convulsive activity with dissociative anesthetics (ketamine & Telazol). If convulsions occur they can be treated with diazepam



(0.2-1 mg/kg IV), or if xylazine-ketamine was administered additional xylazine (0.25-0.5 mg/kg) can be administered IV.

#### Combinations

Xylazine 2 mg/kg + Ketamine 6 mg/kg. Reversal. Yohimbine 0.2 mg/kg

Telazol 8 mg/kg

Medetomidine 60-100 ug/kg + Ketamine 3-5 mg/kg. Reversal. Atipamezole

240-400 ug/kg.

#### **Felids**

##### ❖ **Mountain Lion:**

Xylazine 2 mg/kg + Ketamine 10 mg/kg. Reversal: Yohimbine 0.3 mg/kg

Telazol 2-16 mg/kg (4 mg/kg)

##### ❖ **Lynx or leopard:**

Xylazine 1 mg/kg + Ketamine 10 mg/kg. Reversal: Yohimbine 0.2 mg/kg

Telazol 10 mg/kg

#### **Supportive care during anesthesia**

- ❖ Eye drops: Animals will often keep their eyes open during anesthesia. It is important to use eye drops to keep the eye lubricated and prevent the development of corneal ulcers.
- ❖ Airway management: animals under anesthesia cannot protect their airway. In a controlled environment a tube is placed into the trachea to keep the airway open. If no endotracheal tube is used it is important to keep the head and neck extended. If the animal regurgitates the head should be placed lower than the body and the mouth should be flushed.
- ❖ Position: If possible animals should be maintained on their belly. They should not be put on their back if possible. avoid pressure on the limbs and avoid hard surfaces as these can cause muscle or nerve damage.
- ❖ Temperature: If possible animals should be immobilized during cool hours of the day. If this is not possible they should be kept in the shade and direct sunlight should be avoided.