
CURRENT CAPTURE TECHNIQUE AND DRUG DOSAGE REGIME FOR THE IMMOBILIZATION AND TRANQUILIZATION OF FREE-RANGING BLACK RHINOCEROS (*Diceros bicornis bicornis*) IN NAMIBIA

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Abstract

A dosage of 3.5-4.5 mg of etorphine combined with 120-250 mg azaperone or 80-100 mg xylazine was used to immobilize 172 free-ranging black rhinoceros (*Diceros bicornis bicornis*) from 1990-1997 in Namibia. With good dart placement induction time was 5-7 min. Rare adverse respiratory and cardiovascular depression has been reversed by i.v. administration of respiratory stimulant, (200-300 mg doxapram) and a partial narcotic antidote (10 mg nalorphine). Neuroleptanalgesia is routinely reversed with diprenorphine. Injury during loading, especially in rough terrain has been greatly reduced by "walking" the rhino after narcotic effect is partially antagonized with a low dose of nalorphine. Aggression and stress of rhino confined in bomas is reduced when administering a combination of long-acting tranquilizers: 100-200 mg Clopixon-Acuphase and 100-200 mg Trilafon. Black rhino immobilization and translocation using present capture and handling techniques has been highly successful. No rhino have died as result of the drug combination used, and translocation related losses have been low. The capture and translocation success has been superb with the present dosage regime and capture technique.

Introduction

Black rhinoceros have been immobilized regularly in Namibia since the 1960's for certain management reasons including translocation. Over the years the combination of immobilizing drugs used and capture procedure has been altered to reach a safe effective drug combination and optimal handling technique for black rhinoceros. Since 1990, the drug combination administered to immobilize black rhinoceros and the handling technique used by the Game Capture Unit of the Ministry of Environment and Tourism in Namibia have been fairly consistent. During the period from 1990-1997, a total of 73 black rhinoceros have been immobilized for translocation. Almost all of these rhinoceros were immobilized for initial capture, placed in a boma to settle down and were subsequently immobilized at least once more for further procedures and loading for onward transport. Additionally, 94 free-ranging black rhinoceros have been immobilized for other procedures. Neuroleptanalgesia in these was reversed on site, once the procedures had been completed. Five free ranging black rhinoceros were immobilized for medical examination and treatment. Some of these were in very poor state and condition prior to immobilization.

Methods

Standard capture technique:² The Ministry of Environment and Tourism in Namibia make use of trackers on the ground as well as aircraft (Cessna 172/182) to locate black rhinoceros. A helicopter is called in once a suitable animal has been spotted. The helicopter is only used for darting and lands near the rhino as soon as it becomes immobile. The plane circles above the rhino and guides the ground team into position. This routine greatly reduces helicopter flying time and thus the cost of the capture operation. Once all staff is in position, the plane resumes the search for other rhino.

It takes 5-10 min for the rhino to become immobilized with the drug combination used. The required drug doses are administered by injection. The animal is doused with water to prevent its body temperature rising above 39° C. Even though immobilized black rhinoceros are usually placed in sternal recumbency, it helps to let a rhino lie on its side, with the axilla and groin turned into the wind, to assist in cooling the animal down. The horn tip is cut off to prevent it being broken during confinement. Blood and tissue samples are taken, and microchips implanted subcutaneously as well as into both horns. Dental casts are taken for age determination.

A crate is then placed in front of the rhino. A rope fitted around the head of the rhino is pulled through the crate and secured to a vehicle. A team of laborers holds this rope and, once the rhino stands up following the administration of the anaesthetic antidote, pulls the rhino into the crate. In addition, the rhino is helped to its feet and directed into the crate by prodding from behind. Black rhinoceros do not like to walk backwards out of crates, therefore the crates are loaded into the truck with the rhino facing backwards. Once loaded into the crate, the rhino is transported immediately to a holding pen and off-loaded, or loaded over onto a mass crate. If rhino are transported directly after capture, they should reach their destination within 20 hr, where they are boma-trained for 4-8 wk, prior to release. If this is not feasible due to the traveling distance involved, the rhinoceros are boma-trained near the capture site for at least 4 wk, and are then transported to their new environment, where they are held in bomas for an additional two wk.

Rhino capture in Namibia takes place during the cooler hours of the day to reduce the chance of heat stress. In addition, all rhino translocations are normally carried out before the end of May. This ensures that all boma confinement and long distance transport are finished before the cold winter months and that there is still enough good quality browse available once the rhino are re-released. Depending on the boma size six to eight black rhinoceros are caught at a time.

Drug combination administered: Black rhinoceros are preferably darted from helicopter as described above. A Cap-Chur 3cc syringe with NCL-3 needle and standard tailpiece is delivered using a Palmer extra long-range projector. Considerable power is needed to penetrate the 3.5 cm thick skin. The dart is usually placed in gluteal muscles of the rump. When darting rhinoceros on foot, a Cap-Chur 2cc syringe with NCL-3 needle and plastic tailpiece is delivered using a Palmer extra long range projector or a Pseudart powder projector. In this case any suitable large muscle mass is used (often shoulder muscles or neck muscles).

A dosage of 3.5-4.5 mg of etorphine HCl (M99, C-Vet, South Africa) is used for adult rhino.¹ The exact dosage rate depends on the size and condition of a rhino. This is combined with 120-250 mg azaperone tartrate (Azaperone, Kyron Laboratories, Pty. Ltd., South Africa) for the tranquillizing and muscle relaxant effect. Alternatively 80-100 mg xylazine (Bayer, Leverkusen, South Africa) can be used. The induction time is considerably reduced if the tranquilizer or muscle relaxant is added. Additionally, with such a combination the trembling effect due to the M99 in black rhinoceros is greatly reduced. When hyalase is available, 4500 IU of this drug is added. The use of hyalase does increase the absorption of the drugs significantly, if darts are well placed and thus shortens induction time by more or less 1 min. Often a slightly higher drug dose is used when darting from helicopter in bad terrain, to get rhino down quickly. Lower doses are used for immobilizing rhino in bomas, where they are confined and a slower downtime is acceptable. Dosage rates, especially the tranquilizer dose, have to be reduced for animals in poor condition.

Most black rhinoceros will show effects of the drugs within 3 min. They may slow down, ears turn back and they exhibit a typical high-stepping gait. It becomes almost impossible to steer rhino away from dangerous terrain once the drugs have taken effect. Therefore darting is done on suitable terrain and the darted rhino is pushed to the most open, level area slowly, until they become affected. Usually the rhino will be immobilized 5-10 min after darting (preferably within 5-7 min). The induction time is directly related to the drug dosage used and closely correlated to good dart placement, which enables deep intra-muscular injection of the entire dart volume. If no effect is seen after 5 min, usually another full drug dose is given. If drug effect is seen, but a rhino is not down within 10 min a further partial or full dose is given, depending on terrain, drug effect, etc.) It is always preferred to dart rhino from helicopter. This enables easier and better dart placement. The rhino can be directed away from steep slopes or gullies. It is possible to re-dart from the helicopter, if the drugs do not effect the rhino sufficiently. The veterinarian reaches the rhino immediately once it is immobile.

Once the rhino is reached an intravenous catheter is placed immediately in an ear-vein to keep the venous system open for drug administration. The respiration is checked. A respiratory stimulant (e.g., 200-300 mg of doxapram; Dopram, Continental Ethicals, Pty., Ltd., South Africa) and a partial narcotic antidote (e.g., 10 mg nalorphine) are kept handy. This can be administered routinely, but may cause the rhino to get up with external stimuli. If the breathing rate is reduced to less than 6/min, the doxapram and/or nalorphine are administered intravenously. Additionally, the colour of the mucous membranes is monitored. The blood vessels on the back of the ears help to indicate blood pressure. If the mucous membranes are bluish/ grey or the blood vessels are not prominent 10-20 mg of nalorphine and 10-15 ml of doxapram is administered. If breathing rate remains down/irregular, mucous membranes remain bluish and blood pressure does not increase a repeat dose of doxapram and/or nalorphine or complete reversal is indicated. This happens rarely in black rhinoceros. The heart rate is usually in the range of 60-90 beats/min.

Black rhinoceros respond very well to the antagonistic effect of diprenorphine HCl (M50-50, C-Vet, South Africa). A dosage of 2.4 mg diprenorphine/mg etorphine is routinely administered intravenously to reverse the anaesthetic. The rhino will respond by twitching the ears and becoming

alert within 45-90 sec of intravenous injection. Usually a rhino is back on its feet within 60-120 sec of reversal agent administration. If a rhino goes down in terrain unsuited for loading into a crate, or for complete reversal, the rhino is blindfolded and a person is positioned on either side of the animal. A rope is placed behind the posterior horn around the head and another rope on one of the hind-feet, to act as a brake. Staff keep the ropes under some tension, after the intravenous administration of 20-40 mg nalorphine. The rhino is prodded after about 3-5 min. Failing to get up, additional doses of 10-20 mg of Nalorphine are used at 5-min intervals. Once the rhino is up on its feet, it can be led to suitable terrain by exerting tension on the ropes and pressure on the side of the neck and head, while prodding from behind. The rhino can be walked straight into the crate or a complete antidote is given for release. This method of "walking a rhinoceros" after partial narcotic reversal is now used routinely to load rhino into the crate. This reduces the chance of injury to the rhino or staff during this procedure. The use of pure antagonists (e.g., naltrexone or naloxone) to reverse the narcosis in black rhinoceros has not been necessary, but these drugs could be used, should an animal not respond well to other antidotes.

The use of muscle relaxant or tranquilizer not only improves the level of neuroleptanalgesia, but also is ideal for reducing the stress of rhino confined in crates after capture. During long transport, if a rhino become restless, it is sometimes necessary to top up the tranquilizer. azaperone is usually administered intramuscularly in increments of 100 mg.

Black rhinoceros, which are confined in bomas during translocation are injected intramuscularly with 100- 200 mg zuclopenthixol acetate (Clopixol-Acuphase, Lundbeck, South Africa). This long-acting tranquillizer has an excellent sedative effect, which lasts for 3 days in black rhinoceros. This is ideal to reduce initial aggressiveness of rhino confined in bomas and minimizes injury to the rhino and damage to the boma. Clopixol-Acuphase is used in combination with 100-200 mg trilafon enanthate (Trilafon, Scherag, South Africa) injected intramuscularly. The effect of Trilafon is not as noticeable as that of Clopixol-Acuphase, but is important in minimizing aggression and stress experienced in confined rhino for around 14 days. After 2 wk rhinos are typically used to the boma routine and seem to tolerate the confinement without further sedation. For long distance transport 100-200 mg Clopixol-Acuphase is used successfully. Usually no top-up dosage is required.

Rhino are routinely treated with topical (in dart wounds) as well as systemic broad-spectrum antibiotics, B vitamins, selenium and vitamin E, endo- and ecto-parasiticides.

Results

During the period from 1990-1997, a total of 73 black rhinoceros were immobilized for translocation.³ Only one of these rhino died during the capture. This rhino bull was initially captured and placed in the boma successfully, but managed to break open the boma gate and escaped. The rhino ran almost without a break and without drinking for three days, through communal farmlands and even through a small village and had to be recaptured. While being loaded this rhino seized and died. Over-exhaustion and hypo-glycemia caused this death.

A group of six black rhinoceros kept in a boma during the winter of 1995 lost condition due to the poor quality of browse available. A sudden, severe cold spell resulted in the death of three of these rhino. One rhino broke off its horn in the boma and was released. The carcass of this bull was found 3 mo later. This mortality could have resulted from the trauma sustained in the boma.

In the period from 1990-1997, 69 black rhinoceros were released in a new environment. All releases were very closely monitored. Only two of these rhino died in the post-release period. One rhino failed to find water and disappeared into mountainous terrain, where it died. A young heifer, which had lost condition post release and was finally severely injured by an adult black rhinoceros bull also died 2 mo after release from the boma.

All 94 free-ranging black rhinoceros captured for a combination of procedures from 1990-1997 survived the capture and procedures.³

Five black rhino presented with varying degrees of debilitation or injury during the study period. One of these had sustained severe fighting wounds, another had severe burn wounds sustained during an extensive veld-fire and a third rhino had been stuck in the mud of a waterhole. These three rhino died in spite of attempted treatment, but had all survived the immobilization and transport to a boma. Another rhino with fighting wounds and one with fractured metatarsal bones II, III & IV, were treated and confined in bomas and healed, so that they could be re-released.

Discussion

During the years 1990-1997, a total of 172 free-ranging black rhinoceros have been immobilized for capture and translocation, or for a procedure to be carried out on site. Of these only one bull, who was severely stressed, died on re-capture. Not one of the many rhino immobilized, died while confined in a boma. Thus the success rate of immobilization using the combination of 3.5-4.5 mg M99 with either 120-250 mg Azaperone or 100 mg Xylazine, must be regarded as a very safe dosage regime. The induction time of 5-7 min with good dart placement using this dose is acceptable. Very few respiratory or cardio-vascular problems have occurred. When there have been respiratory problems, these are well-controlled using respiratory stimulant and partial narcotic anti-dote. Injury during loading, especially in rough terrain has been greatly reduced by "walking" the rhino after narcotic effect is partially antagonized with a low dose of Nalorphine. Aggression and stress of rhino confined in bomas is reduced when administering a combination of long-acting tranquilizers: Clopixon-Acuphase and Trilafon. The entire translocation process using present capture and handling techniques has been highly successful.

Of the 9.6 % (7/73) that died during or after translocation, nearly half died due to adverse climatic conditions. The low post release losses (2/69) have been achieved by minimizing stress during the entire translocation. The adequate use of long acting tranquilizers and good handling facilities and techniques play an important role in achieving this level of success.

ACKNOWLEDGMENTS

The success of black rhino translocations in Namibia during 1990-1997 could only be achieved with the help of the dedicated staff of the Game Capture Unit, Ministry of Environment and Tourism in Namibia.

LITERATURE CITED

1. Morkel P. 1989. Dosages for the chemical capture of African Game. Ministry of Wildlife Conservation and Tourism, Namibia.
2. Reuter H.-O., Lindeque M. 1998. Rhino Conservation in Namibia- a framework for private sector participation. Ministry of Environment and Tourism, Namibia.
3. Winterbach H. 1998. Game Capture Summary Report: 1970-1997. Ministry of Environment and Tourism, Namibia.