Transport and boma management techniques for black rhinoceros *Diceros bicornis* as used in the Etosha/Vaalbos operation

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The translocation of six black rhinoceros from the Etosha National Park (Namibia) to the Vaalbos National Park (Republic of South Africa) is described. Data are provided on the transporting vehicle, the capture, transport and off-loading procedures followed while aspects of boma management are briefly dealt with.

Key words: Black rhinoceros, capture techniques, transport techniques, Etosha National Park, Vaalbos National Park, boma management.

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Introduction

Black rhinoceros *Diceros bicornis* (Linnaeus, 1758) have been successfully translocated over long distances in the past as documented by Condy (1964), King (1969), Hitchins, Keep & Rochat (1972), Keep (1973) and Hofmeyr, Ebedes, Fryer & De Bruine (1975). At the end of the dry season of 1987 five adult and one juvenile black rhinoceros *(D. b. bicornis)* were translocated from Otjovasando in the Etosha National Park of Namibia to Vaalbos National Park near Kimberley in South Africa. This was the first reintroduction of this species to this northern Cape park. A distance of ± 2 200 km was covered in a journey lasting 26 hours, after which the rhinoceros were confined in bomas and later released. Basic techniques, problems and solutions are discussed.

Methods

1. *Vehicle*

The vehicle used for the translocation of the rhinoceros was a Mercedes Benz 2628 V-series mechanical horse on loan from Mercedes-Benz S.A. (Pty) Ltd., and a rhinoceros transport trailer belonging to the National Parks Board of Bophuthatswana. The trailer has a steel construction, with two parallel rows of three compartments, accommodating six animals (Fig. 1). Each individual compartment is 340 cm long, 110 cm wide and 227 cm from floor to ceiling. The compartments are separated in the short axis (width) by two solid sliding doors. These doors can be pulled out half their length to the side, thus allowing the two compartments they separate on the opposite side to form a single unit. Should both doors be pulled to one side the three compartments on the opposite side form a single, long unit, thus allowing the animal to walk from one end of the trailer to the other. Along the length of the trailer the compartments are separated by a fixed steel division.

Fig. 1. Vehicle used for the translocation of black rhinoceros from the Etosha National Park (Namibia) to the Vaalbos National Park (RSA).

The total width and length of the trailer is 260 cm and 1 140 cm respectively. There is a ventilation gap of ± 30 cm between the top of the outer side walls and the roof. The roof has two ventilation trapdoors for each compartment which can either be partially or completely opened. The floor of each compartment was covered with a thin layer of sand. This was to act as bedding and to absorb urine.

2. *Bomas*

The holding pens or bomas at Vaalbos National Park (Fig. 2) are constructed from weathered, creosoted poles cemented into the ground. They consist of two rows of three bomas separated by a passage 140 cm wide. This passage continues in a semi-circular form, narrowing down to a width of 100 cm and ending at the loading ramp. Each boma compartment is 500 cm × 500 cm square and the sides are 230 cm high. Gates, situated in the corner nearest to the loading ramp, are 150 cm wide and constructed of a steel frame reinforced with vertical droppers and covered with thick, rubber conveyer belting. The gates are designed to open in both directions and are also fitted with an instant release locking mechanism which is activated when the gate is closed.

The water troughs which are constructed from cement, are 100 cm square outside and 70 cm square inside with a depth of 40 cm. They are raised 30 cm above ground level to avoid contamination with dung and ground (King 1969). Each boma is fitted with a steel cable ± 30 cm from the top of the outside wall, and there is a 50 cm wide catwalk along the outside of the boma at a height of 125 cm above the ground (Fig. 3).

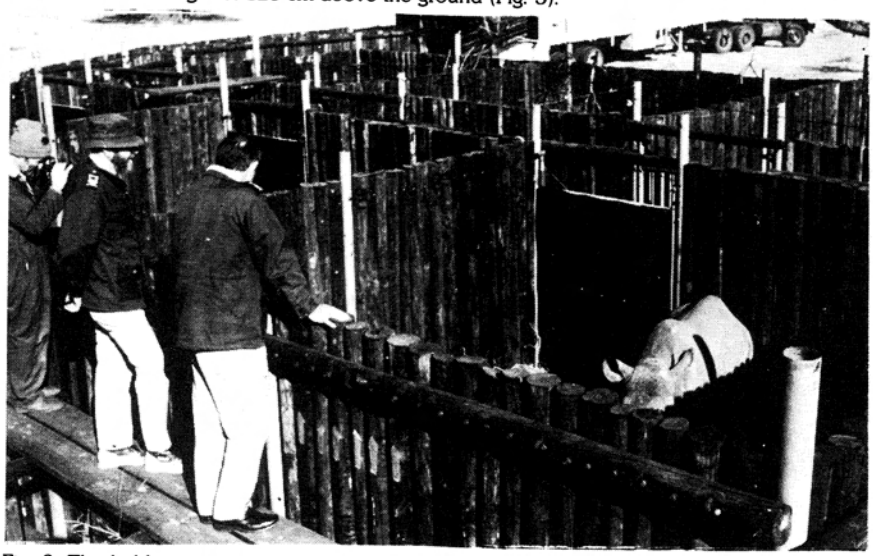

Fig. 2. The holding pens or bomas at Vaalbos National Park, with vehicle used for translocation of black rhinoceros in the background.

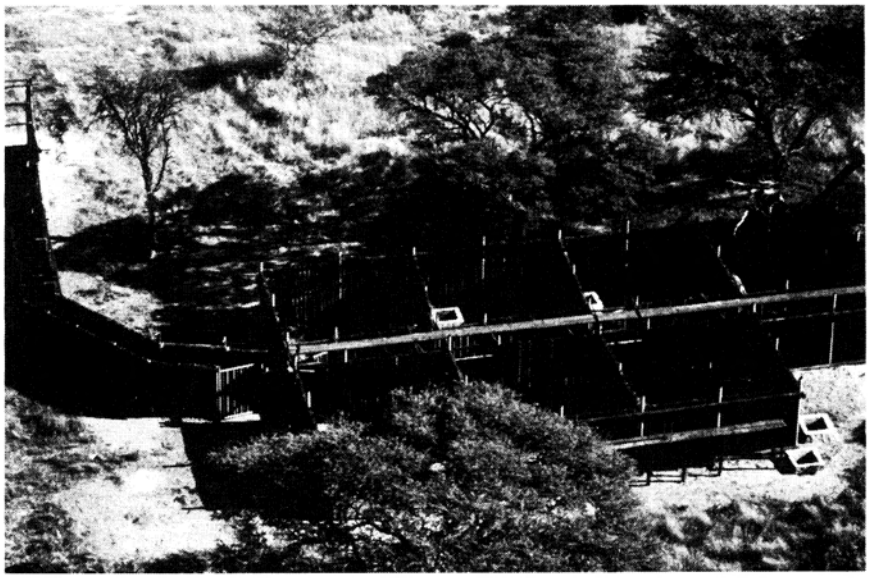

Fig. 3. An aerial view of the bomas at Vaalbos National Park.

3. *Capture and loading*
The rhinoceros capture operation commenced at daybreak and was conducted by the Game Capture Unit of the Directorate of Nature Conservation and Recreation Resorts, Namibia. The rhinoceros were darted from a Bell Jet Ranger Helicopter loaded into mobile crates, and brought to the transport vehicle (Morkel 1989). We opted for transport immediately after capture rather than boma confinement prior to translocation as done by Hitchins *et. al.* (1972).

As the rhinoceros trailer could open at both ends, the rhinoceros were loaded from the front end of the trailer. The two sliding doors were pulled out to one side in order to form a corridor to the rear compartment. The vehicle with the crate and rhinoceros was parked against the front end of the transport vehicle.

The design of the crates is such that on opening the doors, the baseplate bridges the gap between the two vehicles and the doors lock in to form a passageway. The rhinoceros is then allowed to walk down the trailer to the rear compartment, the sliding door behind it is pulled closed, thus confining the rhinoceros to this compartment, and loading the next compartment can commence.

Loading the rhinoceros in this fashion results in them facing to the rear of the vehicle (opposite of King 1969). No advantages in travel comfort or behaviour were noted in rhinoceros facing either direction (Denney 1969). However, when facing to the rear there is less chance of injury to the head region and loss of horns should the driver need to brake suddenly (Hofmeyr *et al.* 1975; Keep, Tinley, Rochat & Clarke 1969). Secondly, the off-loading process is facilitated as the vehicle can reverse against the off-loading ramp and the rhinoceros can walk off forwards into the boma.

4. *Transport*
The capture and loading operations were completed by 16:00 on 24 January 1987 and the vehicles departed immediately. The transport vehicle was escorted by a microbus in which a supporting crew, including a veterinary surgeon, travelled (Fig. 4). Two men shared the driving of the translocation vehicle, one of them a mechanic. Regular stops were made for refuelling at which time the rhinoceros were inspected. Arriving at Vaalbos just after sunset the following day, the rhinoceros were darted inside the truck with Azaperone at a dose-rate of 200 mg per adult animal and 50 mg for the calf as a preliminary to off-loading the animals.

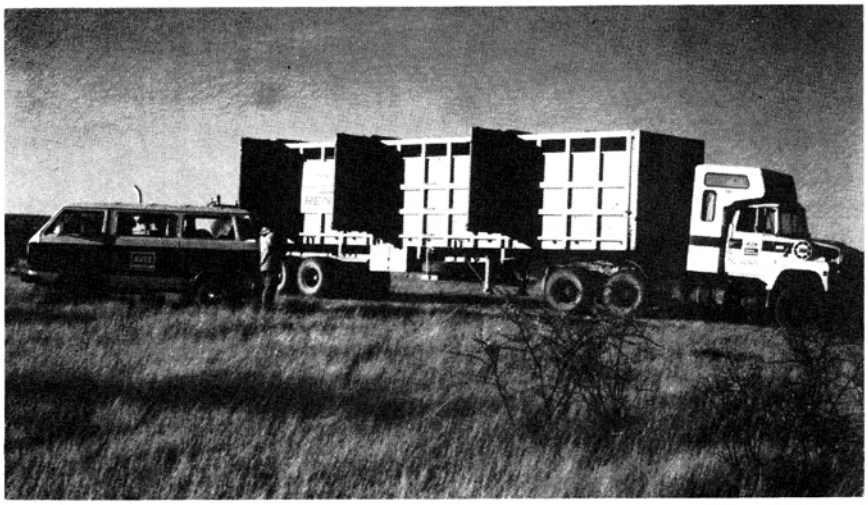

Fig. 4. The transport vehicle carrying black rhinoceros from Etosha National Park to Vaalbos National Park with escort vehicle carrying supporting crew.

5. *Off-loading*

Preparations for off-loading at night had been made. The off-loading ramp, passageways and bomas were lit dimly by coloured electric lights (mostly orange, yellow and green) suspended over the structures. The lighting was sufficient to ensure that the animals could see their way down the passage, but not so bright as to encourage them to move quickly (Fig. 5). The rhinoceros were allowed to leave the vehicle one by one in complete silence. No stimulation was used at all and the animals were left to explore the dimly lit passageway in their own time. Once they were in the boma the gate was shut immediately. Soon after entering their pens, all of them drank water and started feeding from the branches that had been placed in the boma beforehand. The same behaviour was experienced by Condy (1964) and Hofmeyr *et al.* (1975).

Fig. 5. Black rhinoceros were released at night with bomas dimly lit by coloured electric lights, softly illuminating the plastic sheeting.

Boma management

The cow and calf were placed in separate but adjoining bomas initially but they were reunited a day later. The gates of the pens of the calf and cow were opened in opposite directions in to the passageway. The calf was allowed to walk to the cow in its own time. On entering the boma the cow tensed up, and placed her head on the calf's back, after which they both relaxed and the calf started suckling. The same protocol was followed by Hofmeyr *et al.* in 1975 without complications.

The animals were fed *ad lib.* on mainly camelthorn *(Acacia erioloba)*, *Grewia* spp. and *Ziziphus mucronata* branches which were suspended from the cable mentioned before. Branches with an abundance of new shoots and fresh leaves were selected where possible. No additional concentrates were fed.

The bomas were cleaned daily by firstly removing all the branches still hanging on the cable, and secondly retrieving the fallen branches from the floor of the boma with a grappling hook.

1. *Release*
A 200 metre long gradually widening funnel consisting of capture plastic suspended from a wire, lead from a side gate in the passageway between the pens and the loading ramp. Before daybreak a floodlight was switched on, shining down this funnel. This effectively illuminated the funnel area, and the light reflected off the plastic walls contributed to creating an impression of the walls being solid barriers. This successfully guided the rhinoceros in their walk down the length of the funnel. Each day 1-2 hours before dawn one rhinoceros was released by simply opening the gates in silence, and allowing the animal to leave in its own time. The cow and calf left together.

Acclimatisation periods of 4-6 hours (Anon. 1971), 4-6 weeks (Hofmeyr *et al.* 1975), 6-16 days (Hitchins *et al.* 1972) had been used successfully in the past but we started releasing the rhinoceros after 4 days of boma confinement. This confinement was necessary to eliminate agitated dispersal after release into a new environment (Keep 1973).

2. *Follow-up*
Hind spoor were measured and notes were made of specific characteristics of the footprints of each animal. Approximately 5 hours after release, each rhinoceros was tracked until visual contact was made. This ensured that the rhinoceros had not broken through any fences and left the park, and that they were all calm in their new environment. Animals were regularly followed up for two weeks after the release to monitor their condition and whereabouts.

Discussion

Many potential problems were identified and encountered. Solutions were found for most of these.

1. *Boma confinement*
Boma confinement for two weeks at the capture site, before subjecting the animals to a long journey, is probably a better protocol than is immediate transport. The animals will most likely tolerate the journey and boma confinement at the destination much better and this should reduce the chances of injuries and mortalities.

2. *Rhinoceros behaviour in vehicle*
The "pushing" against the wall of the compartment during transport as described by Hitchins *et al.* (1972), Keep (1973), and King (1969) was not observed. This was most likely due to the Azaperone which was added to the capture cocktail. Although the effect of this drug did not last for the duration of the journey, it is possible that the movement, vibration and sound of the vehicle had a further calming effect on the animals as no pushing occurred during the journey and subsequently no more tranquilliser was administered until just before off-loading. Had the rhinoceros started pushing, Azaperone would have been administered at a

dose of 200 mg for adults and 60 mg for the calf, which probably would prevent this behaviour (Haigh 1977).

3. *The rhinoceros transporter*
No serious problems were encountered with the design or construction of the transport vehicle but the sliding doors refused to open at off-loading. This was due to the sand that had impacted on the guide rails. This delayed off-loading for up to 3 hours as the sand had to be scratched out with a long wire. Coarse straw would probably be a better bedding as the sand formed a dust cloud inside the truck which might lead to eye irritation and discomfort of the rhinoceros.

Although rhinoceros are known to tolerate extreme temperatures on both ends of the scale (Jones 1979), the wind chilling factor during the night of transport resulted in the animals shivering and being uneasy. A tarpaulin was secured over the ventilation gaps in the front and on the sides. This proved to be helpful but took a long time to fit, unnecessarily delaying the operation. A ready-made tarpaulin that fits the corners of the vehicle and has the correct lengths of rope attached for securing, should be made for the trailer for future operations in the colder months.

4. *Driving team*
Two drivers were found to be inadequate and the men had to drive long shifts whilst being extremely tired. A third driver and a horse with a sleeping bunk would solve this problem. The horse was also not powerful enough, resulting in a low average speed of approximately 75 km/h and thus an unnecessarily long travelling time.

5. *Tranquillisers*
Darting the animals with Azaperone in the truck on arrival posed another problem. A CO_2 Cap-Chur pistol was used which proved not powerful enough to penetrate the rhinoceros' skin, even at full force and close range, except when the dart was fired into the softer, thin-skinned tissue. Although the butyrophenones of which Azaperone is a member are inhibitors of the learned reflexes like feeding (Denney 1969) it is still preferred as most suitable for black rhinoceros, as anorexia has not been encountered.

6. *Boma construction*
The construction of the loading ramp delayed the off-loading slightly. The walls of the passageway did not reach the front end of the base of the loading ramp, resulting in a gap between the vehicle and the passageway. This was closed with loose poles and planks as well as using the rear extra swing door of the vehicle, but caused unnecessary delay and risk to the off-loading procedure. No problems were encountered due to basic boma design.

Bomas with spaces of ± 10 cm between the poles have been suggested (Henwood 1989). Such construction allows the animals to have clear vision of outside activity and has a calming effect on them. It has also been suggested that the boma walls are initially covered with plastic, which is lowered systematically over a few days and finally removed.

The construction of the gates were found to be inadequate as the rhinoceros soon removed the conveyor belting and broke the vertical droppers. A better securing of the conveyor belting would have prevented this.

7. *Feeding*
The animals were found to be very calm in the bomas and ate from our hands within 48 hours. Feeding mainly at night, they consumed the food provided in a short time. This happened once before the next batch of food arrived, resulting in a restless and frustrated bull who constantly hit the wall of the boma with his horn. He calmed down immediately once the new food arrived and we subsequently changed our feeding policy from set times (Hitchins *et al.* 1972) to constant replenishment. This keeps the animals calm and well behaved.

8. *Release*
The release process went off well. The animals were found to be calm and moved out slowly with no risk of injury. They all started feeding soon after leaving the bomas and even spent some time in the vicinity of the bomas before moving off to explore the rest of the park. However, on tracking them we found that they walked up to 24 km the first day before resting.

Acknowledgements

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