Table 1. Model: 10 rhinos are introduced; the first 3 calves and half of all succeeding calves go to the Save Valley Conservancy Trust

Year	Rhino numbers	Annual gain	SVC Trust gain
2005	10	0	0.0
2006	11	1	1.0
2007	11	0	0.0
2008	12	1	1.0
2009	13	1	1.0
2010	14	1	0.5
2011	15	1	0.5
2012	16	1	0.5
2013	17	1	0.5
2014	18	1	0.5
2015	20	2	1.0
2016	21	1	0.5
2017	23	2	1.0
2018	24	1	0.5
2019	26	2	1.0
2020	28	2	1.0
2021	30	2	1.0
2022	32	2	1.0
2023	34	2	1.0
2024	36	2	1.0
Total gain to SVC Trust			14.5

Zimbabwe's wildlife operations regain tourist interest and donor confidence, opportunity to sell progeny from the breeding herd will be limited, which also adds to the long-term nature of return from this community investment. Nonetheless, it has clearly established a model for community involvement, and the principle is likely to be as important for building better community relations as the actual financial return on this investment.

New thinking on white rhino bomas in the big game parks of Swaziland

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Traditionally, white rhinos have been confined in solid, close-pole barriers where the animal's will to escape is overcome by its inability to break through the poles. The animal then submits to its new surroundings, where it either starts eating after some days or embarks on a hunger strike.

Hunger strikers are common among white rhinos newly placed in a boma. The dilemma for a boma manager is whether to release the rhino before it loses too much condition or to hold it for another day or two in the hope that it will start eating. Often animals have been caught and moved long distances to a boma, and releasing them in poor condition into an unfamiliar range that is often already occupied is not only undesirable—it may be positively dangerous!

Most white rhinos that adapt to boma life start eating between the third and seventh day of confinement. It is generally accepted that animals that are on hunger strike or are consuming insufficient food should be released by day 7. If a hunger-striking rhino remains confined, it will eventually become weak and die, despite a plentiful supply of good-quality feed being offered.

A hunger strike is not the sole determinant of when to release a rhino from the boma, as other factors such as body condition, age, sex, pregnancy, release site,

veld condition, water availability, gut motility (M99, used in darting, can cause gut stasis), the animal's temperament, its dominance status, and the likelihood of its developing gut ulcers must also be taken into consideration.

Why do white rhinos hunger strike?

To try to understand why white rhinos hunger strike, we must look at the rhino's life, which is generally a routine of eating, drinking, wallowing, socializing, breeding and maintaining personal hierarchy. Capture suddenly interrupts this life. The rhino is released in totally unfamiliar surroundings, still feeling the side effects of various drugs. A solid pole barrier that it cannot break through confines its movements in an area of 100 m^2 or less. This barrier is usually difficult to see through, and a range of unfamiliar smells and sounds constantly emanate from somewhere beyond.

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Wholly electrified Bonnox wire mesh fencing on wooden posts with used polyurethane piping and (white) Meps bobbin insulators.

Humans also constantly emerge from behind it. Suddenly, everything is a threat. Additionally, unfamiliar food, no longer rooted to the ground, is offered and invariably carries the scent of humans.

Over the next few days, the rhino either accepts its new lot or works itself into a hunger strike, ignoring the hunger pangs.

The alternative boma

After white rhinos were observed reacting to contact with electric fencing by taking a submissive step back with a lowered head and not attempting to horn it, we decided to move away from the solid physical barrier and attempt to boma white rhinos behind an electrified Bonnox wire mesh fencing (see photo).

During 2003, 13 elephants 12 to 14 years old were confined to a boma for five months pending export from Swaziland. During this period they destroyed all the trees, leaving a field of grass to grow during the following wet season. This boma was fenced wih wholly electrified Bonnox mesh, suspended and insulated by upright wooden posts at 5-m intervals. Wooden droppers were hung at 1.5-m intervals. The Bonnox fence was insulated with a combination of used black polythene piping and conventional Meps electric fence bobbins insulators (see photo). The Meps energizer was coupled directly to the wire mesh.

A 1-ha electrified Bonnox fence enclosure was erected, and 5 m inside it a second fence of the same kind. The inner enclosure was then divided in half to create two 0.5-hectare camps. Two separate Meps energizers were coupled to the inner and outer encampments. The two energizers produced between 8000 and 10,000 volts each.

If an animal should break out of the first fence, or if the fence should stop functioning, the second fence would act independently as a barrier.

The lowest horizontal strand of bonnox was ± 100 mm above the ground. Herbicides were used to control vegetation growing under the wire to avoid any voltage loss.

Bomaing white rhinos

During the autumn of 2005, a two-and-a-half-year-old and a three-year-old rhino were captured, using M99 and 15 mg of tranquillizer Azaparone. Still showing the effects of the drugs (although M5050 had been administered to reverse the effects after the rhinos

were loaded onto the recovery trailer), the rhinos were released about an hour after capture into a 0.5-ha electrified boma. These two rhinos were already relatively accustomed to electric fencing. It was decided not to hang capture plastic on the bonnox as wind action on the plastic might provoke the rhinos to attack and dismantling the plastic might cause additional disturbance. Both animals touched the fence at least three times while they stumbled around the boma and immediately moved away from it each time. By the time the effects of the capture drugs had worn off, the rhinos had both learned to avoid the fence.

A thick swathe of grass had grown during the wet season, and both rhinos began to feed within 36 hours. As the grass became scarce, they were offered fresh-cut grass on a conveyor belt at ground level. Both started feeding on this within three weeks, and good-quality eragrostis hay was gradually introduced.

Encouraged by the results with these two young rhinos, we introduced a further five rhinos (two three-year-olds, two six-year-olds and one adult cow) into two adjacent 0.5-ha bomas. The adult cow was isolated while the four younger rhinos were put together. Importantly, these animals came from an area where their exposure to electric fencing was likely to have been very limited.

All rhinos except the one six-year-old were offloaded in the dark, on average about nine hours after capture using M99 and Azaparone. All animals were given Acuphase at or soon after loading, and their sedation was manipulated with M5050 and Azaparone on the trip. The two three-year-old rhinos were transported in a standard antelope truck with two compartments 2.2 x 3 m and doors 1.1 m wide. All the older animals were transported in rhino trailers approximately 3.5 x 1.2 m.

The two youngest rhinos travelled extremely well in the antelope transporter and did not require continual manipulation with M5050 and Azaparone, as did the rhinos in the trailers.

The rhinos in the trailers offloaded without complication. It took over two hours to offload the two three-year-old rhinos in the antelope transporter with larger compartments, however, because they were able to turn around in the compartments and did not want to come out.

Using a prodder and sack to coax the rhinos out of the truck proved problematic, as doing so worked the animals up to the extent that it nullified the effect of the tranquillizers. (It is always best to leave the truck parked with the compartment doors open, allowing the rhinos to leave voluntarily.) The first rhino left the truck and was promptly shocked by the fence at the end of the ramp. About 10 minutes later, the second rhino left and went to the end of the ramp, where she found the first rhino lurking in the dark. Immediately a fight broke out between the two three-year-olds, with one pursuing the other around the boma, already occupied by a freshly offloaded six-year-old. The rhino being pursued bounced off the electrified mesh at an angle twice before running across the boma, hitting the two fences squarely, and breaking out of the boma in less than five seconds! She then disappeared into the night, leaving her pursuer in the boma.

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The adult cow feeding in the boma.

Reactions to the boma

The remaining three-year-old quickly joined up with the six-year-old, and these two animals made no attempt to break out of the boma that night. The adult cow was isolated in an adjacent boma, separated only by the electrified bonnox mesh.

The breakaway rhino broke six horizontal strands on each fence, leaving the lowest three strands intact. The broken ends projected into the gap, making it too small for a rhino to put its head through without being shocked. Consequently, it was decided not to repair the gaps, so as not to disturb the animals in the bomas until they had settled

down. These breaks did not short out the electricity as an offset wire would have done. In the morning, it was reported that all three rhinos had made contact with the fence a number of times and had immediately moved away from it. No further aggression or attacks on the boma were reported.

By daybreak, the animals were all alert but still sedated by the Acuphase and the after-effects of immobilization. During the first day, as all three rhinos paced the boma boundaries, they came in contact with the fence much less frequently. During the second night, 20 to 32 hours after offloading, the number of contacts with the fence again increased as the animals tried to find a way out of the boma. The two young rhinos started feeding during the second night. We suspected that the adult female also fed, but because she was more unsettled than the others, we avoided any unnecessary disturbance. She was, however, observed taking bites of grass while pacing the boma within 48 hours of being contained.

Water was provided in a ground-level concrete trough that could be filled remotely by an inline valve. All animals drank water within 24 hours of offloading.

On day 4 another six-year-old rhino was introduced into the boma in daylight. She joined the group without any problems.

Six days after the three-year-old rhino broke out of the boma, she was recaptured and returned to the same boma, joining the other three-year-old and the two six-year-olds. She was allowed to stand in the crate under a tree for some hours to stabilize and to ensure that she was not recycling the M99. Her sedation was manipulated using Azaparone and M5050; no Acuphase was used. This time she was offloaded from a trailer without any coaxing, about four hours after capture. The offloading, which took place in daylight, was calm. Although she made contact with the fence, she made no effort to break out the first night. During the second day in the boma (36 to 48 hours) she was observed attempting to break out at a corner. She broke one horizontal strand with her horn before the wire slipped down the horn and touched her skin, shocking her and causing her to squeal and retreat immediately, head lowered and ears back. She returned to the same place and again tried to break the fence, with the same result. This attempt was not a ferocious attack on the fence; rather, she put her horn through the mesh close to the ground and pushed while lifting her head.

She was observed eating the veld grass within 20 hours of recapture. At offloading, two of the animals took bites of grass as they left the trailer.

Eight days after the rhinos were introduced to the bomas, they were offered fresh-cut veld grass. Some was placed standing against bushes and some was placed on a conveyor belt that had been in the boma from the first day. As the natural grass become scarcer, the rhinos began showing interest in the cut grass. By the 13th day, all the rhinos had been observed eating the cut grass. Some fed on the grass placed on the conveyor belt while others fed on the standing grass. All cut grass was then offered on the conveyor belt and good-quality eragrostis hay was mixed with the green veld grass and was readily taken.

Once all the rhinos were feeding well and had settled enough in the bomas to tolerate human activity, the fences were repaired. To avoid sand colic the conveyor belt was lifted onto a pole platform 600 mm high, to avoid the rhinos contaminating the feed with faeces and sand from their feet. All the rhinos fed off this platform cautiously but without any material delay. Surprisingly, none of the rhinos attempted to fight the new structure.

The adult female remained fairly unsettled in her boma. After two and a half weeks, having given the rhinos time to get used to each other, and observing that she was looking at others through the dividing bonnox fence, two rhinos from the adjacent boma were allowed into her boma. No aggression was observed. The following day all the rhinos were put together, with no problems. This calmed the cow considerably.

Once all the animals were eating properly off the platform, horse pellets were dissolved into a watery paste and sprinkled over the erogrostis hay. Then pellets were offered next to the hay. One rhino began selecting the pellets on the third day. Within six days all five rhinos were eating the cubes when they were offered without hay.

Body condition

All the animals were in good body condition when introduced into the bomas, with standard AfRSG condition scores of 4–4.5. As they adapted to the bomas, their continued feeding on the veld grass did not have the acute effects normally experienced by animals introduced to close-pole bomas, where the rhinos normally stop feeding altogether for a number of days, lose condition, and suffer from reduced gut motility

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Feeding off the conveyor belt lifted 600 mm off the ground.

and depression. As could be expected, the rhinos gradually lost condition as the veld grass became scarcer and they graduated to the cut grass. All showed moderate hunger welts on the stomach at about 10 to 20 days, but these disappeared as their food intake increased. The condition scores of the rhinos dropped to a minimum of 3 for one of the three-year-old animals; the score of the other animals dropped to approximately 3.5 and 4. The animal with the poorest condition had also been observed to have numerous horn scratches at capture, which probably were the result of either weaning or conflict with other rhinos after weaning. It is likely that the additional stress of weaning contributed to lower condition scores.

Perceived advantages and disadvantages

Although this method of bomaing white rhinos is still in its infancy and has not been put through sufficient testing to become a recommended practice, it would appear to have considerable advantage over conventional rhino bomaing (table 1). To our knowledge, it has not been tried elsewhere with rhinos, so few references were available for this experiment (Dr Chap Masterson, Zvakanaka Wild Vet., pers. comm.; Mr Grant Tracy, Tracy & Du Plessis Game Capture, pers. comm.).

Suggested improvements to the bonnox boma

We suggest that to improve the strength of the bonnox, three horizontal cables be added, also electrified, to avoid animals breaking through the bonnox. Care must be taken to avoid entanglement and any electric shorts as a result of adding the cable.

Conclusion

Because the effects of Acuphase last well beyond the sedative effects of the capture drugs used for rhinos, using it is probably central to the success of this boma method, particularly with animals that are five years of age and older. The added advantage of the residual effects of M99 from the capture process cannot be overstated. It is thus inadvisable to release animals into a bonnox boma if Naltrexone has been used as the antidote to the M99 or if the rhino is fighting the crate, as this would result in a far more excitable animal, more likely to break into a run at offloading or when initially shocked. In a nutshell, one wants to offload the rhino in as drowsy a state as possible, but without risking oversedating or recycling the M99.

It is common knowledge that big territorial males are the most problematic. To date, we have not put any of these bulls through the bomas. Until such animals have been tried, from areas where they are not accustomed to electricity, we do not know whether this form of bomaing will be reliable and practical for them. It may well be worth exploring the added use of Periphenazine (Trilifon) in these cases.

Due to the cost effectiveness of boma construction and the fewer adverse effects on the animals' health, we recommend that where practical, this technique be tested further as an alternative to the traditional close-pole boma. It appears that this option is less likely to cause hunger striking and is likely to present fewer health problems. We are confident that this method is desirable. It should be the method of choice for all non-breeding animals and may well be suitable for all adult animals.

Table 1. Comparison of the electrified bonnox boma with the traditional close-pole boma

Experimental electrified bonnox boma	Traditional close-pole boma
Advantages	*Disadvantages*
• Openness of the bonnox fencing is less intimidating to the rhino, as it can see what is happening around and beyond the boma.	• Solid sides harbour more of the unexpected and are probably unsettling.
• Gradual approaches can be made without surprising the rhinos and one normally need not go closer than the rhino's flight zone.	• Animals only see approaching people from a short distance well within normal flight zone and within their normal fight zone.
• The space allows for easier mixing of animals, particularly youngsters.	• Mixed animals in small bomas tend to fight especially if they are unknown to each other.
• Naturally growing grass is readily eaten although volume of intake is lower than in the veld.	• No graduation from natural grass to cut grass, and rhinos normally stop eating for some days.
• Gut motility is sustained and stimulated by continued food intake.	• Combined effects of M99 and not eating can cause serious disruption to gut motility.
• As there is no need to add food for the first week or two, the rhinos do not need to be disturbed.	• Food has to be offered before the rhino settles, thus disturbance is unavoidable.
• Veld grass does not carry human scent.	• Grass offered invariably carries human scent.
• Observers can monitor rhinos from a distance without disturbing them.	• Observers normally have to be close and thus disturb the rhinos continuously.
• Rhinos are unlikely to sustain physical injuries as they retreat from the shock.	• Horn knock-offs and bruised lips from fighting and pushing the physical barrier aggravate the situation.
• In a breakout, the strands are unlikely to short out. Repairs can wait as the size of the hole normally will not allow a rhino through it without being shocked	• Any broken poles, and so on, require immediate fixing to avoid animals breaking out or being caught between the poles—thus creating a disturbance.
• Erection is cheaper and quicker for more enclosed area.	• Construction is expensive and encloses only small areas.
• Boma cleaning can be left until the animals have settled.	• Boma cleaning needs to commence before the settle.
• The large area makes it practical to provide a wallow for hot conditions.	• Providing a wallow normally compromises boma hygiene.
• Less stress is likely to reduce the incidence of stress ulcers.	• Stomach ulcers are a common complication.
• Graduation from veld to cut grass can take place over a couple of weeks. Hunger striking less likely.	• Sudden change from veld to cut grass may be a reason leading to hunger strikes.
• Rhinos leaving the bomas are accustomed to being confined by bonnox fences and associate them with electricity—thus they are far less likely to break out of boundary fences	• Upon release, rhinos are unfamiliar with bonnox fencing and are likely to test the fences; the likelihood of breaking out is accordingly increased.
Disadvantages	*Advantages*
• Difficult to access a rhino in the boma in the event of treatment being necessary, especially if there is more than one animal in the boma.	• Easier to access and pole syringe animals.
• If a rhino is unsettled at offloading, it may be able to break out, even if it is young.	• If constructed properly, no rhino should break out.
• Rhino horn does not conduct electricity, and thus damage can be done before the rhino is shocked.	• Conductivity of the horn is irrelevant.
• Time needed to produce fully boma-trained rhinos is longer.	• Shorter time needed to produce boma-trained rhinos.
• Maintenance of the insulation of the electricity is of utmost importance.	• Less constant maintenance is required.
• As bomas can likely be used only twice in a season without irrigation, system is unsuitable for high-volume rhino bomas.	• Can be used all year, as there is no dependence on naturally growing grass.