Rhino Ranching

Management Manual for owners of White Rhinos

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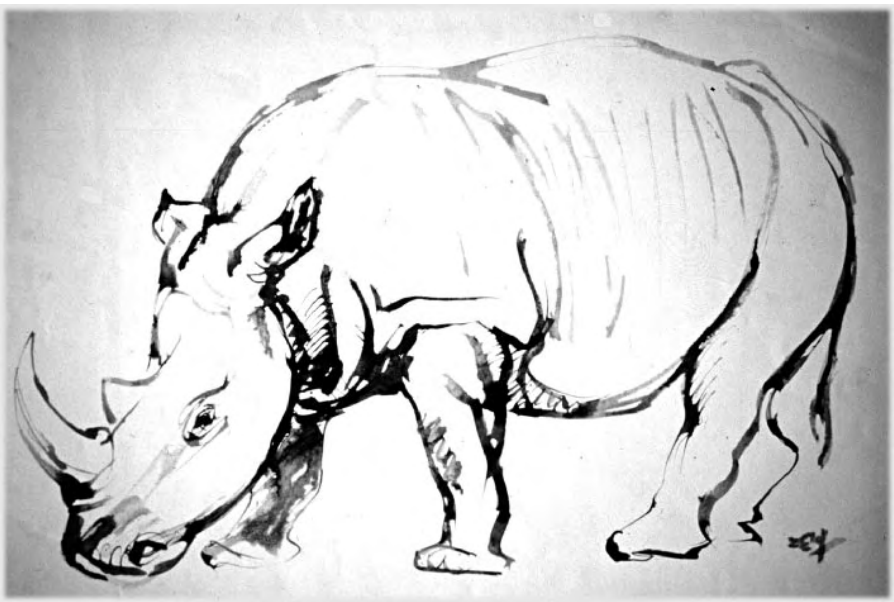

The world's first management manual for prospective and current owners of one of Africa's BIG FIVE — the white rhino.

How to capture, translocate and handle them; how to manage them, their habitat requirements, social behaviour and reproduction... it's all here in concise format. The politics and finance of rhino conservation and utilization are also discussed.

This Guide is a joint project of the South African Veterinary Foundation and the African Rhino Owners Association. Copies can be ordered from:

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A Manual for owners of White Rhinos. By Dr Kobus du Toit.

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White Rhino
by Clive Walker

Foreword...

South Africa is the last stronghold of rhinos in Africa. No less than 80% of all remaining rhinos, both white and black, on the continent occur in this country. There are roughly as many rhinos privately owned in South Africa as there are in the rest of Africa.

In October 1994, a group of individuals concerned about the survival of the rhinoceros attended a meeting at the Onderstepoort Veterinary Faculty, Pretoria. Comprising veterinarians, wildlife managers, scientists and private landowners, the meeting discussed the possibility of creating a forum for private landowners who were actively involved with the management of rhinoceros on private land.

The purpose of the new African Rhino Owners Association (AROA) was to bring together owners of white and black rhinos to promote the survival of this priceless asset. It was recognized that sound records and annual surveys of rhinos on private land are essential. Communication between owners by way of newsletters, notices, symposia and special reports, with the valuable financial support of the Rhino & Elephant Foundation, was recognized as a primary function of the Association, apart from the need to maintain a data-base of the various landowners.

A vital issue was that of security and the need to be in a position to pass on information, knowledge of trade issues and game guard training, and to work closely with organizations such as the Endangered Species Protection Unit, the Game Rangers Association of Africa and the Game Rangers Training Coordination Group. Close cooperation has also been established between the African Rhino Specialist Group, the Rhino Management Group and the Rhino & Elephant Security Group.

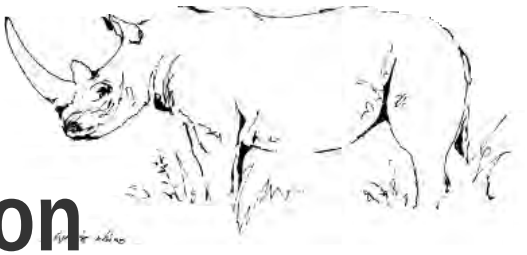
It is imperative that the private landowner become fully acquainted with the management of the rhinoceros on private land and with a wide range of related issues, such as carrying capacities, capture and care before translocation, medical treatment, the importance of working very closely with veterinarians who specialise in this field of African wildlife; the ethics of hunting, boma construction, equipment — all issues which have been brought together in one manual.

Our grateful appreciation is extended to the author, Dr. Kobus du Toit, who initiated the project on behalf of AROA. Much of the future of the rhinoceros in Africa is going to depend upon private landowners. It is our hope that this publication will contribute to the success achieved thus far.

Clive H Walker

Chairman: African Rhino Owners Association January 1998

1 Introduction



THE TEN COMMANDMENTS OF RHINO RANCHING

Objectives

Define the objectives of your rhino ranching before purchasing any animals. For example, if you want to breed rhinos, buy combinations of adult cows with calves. You can be sure that the cow can reproduce and she may even be pregnant again. Avoid animals which are too old. Animals for tourism should preferably come from ranches where they have become accustomed to vehicles or from bomas where they have been kept longer than six weeks. Farmers wishing to harvest rhino horn should select animals specifically for their horn growth.

Administrative principles

Make sure that you become the legal owner of the animals. You should be able to identify them (by means of ear notch codes and microchip implants) and have received clearance from the provincial nature conservation authority. The ranch will have to comply with minimum fencing requirements. Make sure that the veterinary and nature conservation permits for capture and transport are in order.

Obtain a reference list of the seller's previous clients and ascertain whether or not they were satisfied with his services. Insist that your money is deposited in an attorney's trust account before the animals are delivered; payment should only be effected after the animals have been off-loaded.

Origin of the animals

Animals from large reserves, such as the Kruger National Park, which are not used to fences should only be translocated to ranches with electrified fences, to reduce the likelihood of their breaking out. Such animals should also be treated with long-acting tranquillisers such as Trilafon (Perphenazine enanthate) or Clopixol-Acuphase. Rhinos from ranches with electrified fences adapt more readily, since they know and respect fences.

At game auctions, prospective owners should only purchase animals which have been in a boma longer than six weeks. These animals are eating well and are already gaining weight. Animals which have not adapted well in the boma are a risk during capture, transport and reintroduction. Buying animals from a catalogue is therefore a safer and cheaper option. Before buying from a dealer, ascertain whether or not he is equipped to deliver the animals.

Suitable habitat

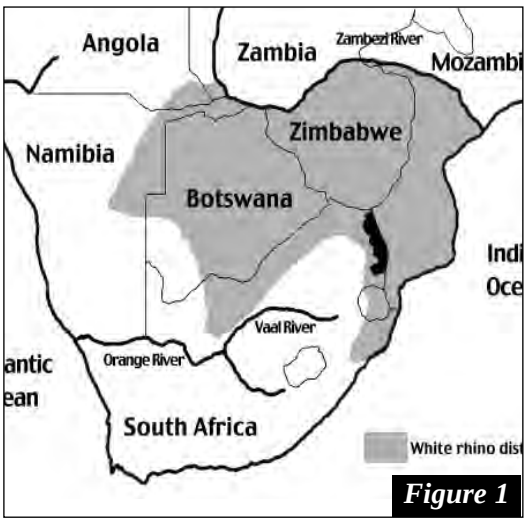


Figure 1

The distribution map of white rhinos (Figure 1) indicates that they did not originally occur in the high-lying inland areas, probably in order to avoid the cold winters of the interior. Open drinking water is required, as the animals like wallowing in mud during the hottest part of the day. Perennial rivers, which rise rapidly during the rainy season, can cause animals to drown if they are trapped on islands, as white rhinos can't lift their heads in order to swim. Mortalities may occur on ranches with sheer cliffs and dongas, as rhinos have poor eyesight and when alarmed will readily run over a precipice if they do not yet know the new area. In the dry season, rhinos may get stuck in the mud in marshy or low-lying areas. It is unwise to relocate rhinos during severe droughts. A survey of 293 rhino deaths on private property revealed that 14% died as a result of drought. These mortalities could have been prevented by supplying lucerne as supplementary veld feeding during droughts. Boma-trained rhinos will take lucerne more readily than other animals.

Minimum ranch size

White rhino are a high-density species and their numbers on small farms are determined by the carrying capacity of the area, which can vary from 1 to 4 rhinos per 100 hectares. In the Umfolozi Game Reserve it is 3,2 animals per 100 ha. Areas less than 10 000 ha should preferably be fenced to prevent the

animals dispersing (in "bomb shell" fashion) when they are released. In large reserves which are not fenced in, animals should be kept in smaller enclosures for 3 to 4 weeks prior to release, to allow them to settle down in the new environment. The average ranch on which white rhinos are kept is approximately 4 000 ha in the Mpumalanga lowveld and KwaZulu-Natal, 1 400 ha in Gauteng and the Mpumalanga highveld, 1 250 ha in the Free State, 9 700 ha in the Eastern Cape and 6 000 ha in the Northern and Northwest Provinces. A survey carried out in 1997 on 140 farms revealed that 75% of the farms were <5 000 ha in extent. These figures confirm that white rhinos are a high-density species.

Land utilization

Rhino ranching has to be compatible with the other farming activities on the ranch. For example, white rhinos do not fit in well with cattle ranching, as they may injure cattle at watering points and may become entangled in camp fences. Where other endangered species are also kept, such as black rhinos, the two species may fight, resulting in mortality of the black rhinos.

Minimum herd size

It has become apparent that single pairs do not always breed successfully. A survey of 13 introduced pairs revealed that one pair produced 2 calves, and 3 pairs produced just a single calf. A minimum herd size of 6 animals

Opposite page: Recently released young white rhino killed by a territorial bull. Dehorning breeding bulls will prevent such injuries. This page: Injuries caused by a rhino bull to the vaginal area of a cow.

(2 males : 4 females) is regarded as ideal for a game ranch. A theory among rhino owners, which has yet to be verified, is that 2 bulls are required on a game ranch to stimulate each other to mate with the cows. Animals should have the potential to double their minimum herd size. The ratio of mature animals (older than 9 years) to immature ones should be 1:1.

Conflict with other animals

On large game ranches with elephants, young elephant bulls may leave their maternal herds during puberty and attack and even kill rhinos. During droughts, hippos and rhinos fight at feeding areas. Fighting may occur, especially among bulls, if rhinos are released on ranches with resident rhinos. Under NO circumstances should young animals be relocated to areas where there are large territorial bulls (photograph opposite). Losses to predation of calves may occur on game ranches harbouring lions, hyaenas or crocodiles.

Disease control areas

Rhinos do not carry foot-and-mouth disease and quarantining is therefore not required when rhinos are taken from foot-and-mouth disease areas. It is advisable to vaccinate rhinos against anthrax if outbreaks of the disease have occurred on the ranch (the vaccine is not registered for game animals). Areas inhabited by tsetse flies should not be stocked with rhinos from areas where trypanosomosis is absent.

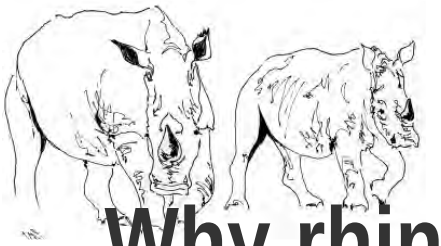
Poaching

Ranches near main roads, larger cities, mines and rural settlements are exposed to illegal hunting of animals. Rhinos are especially vulnerable due to the illegal trade in rhino horn. The Endangered Species Protection Unit of the South African Police Service will undertake a poaching risk analysis of an area for the owner. A fee is charged for this service. Due to effective policing, poaching of rhinos in South Africa is minimal, compared to other causes of mortality. At present it is easier for a criminal to hijack a Mercedes than to track and shoot a rhino in the bush.

In summary:

The prospective farmer should consider the following steps to ensure successful rhino ranching:

1. Consult an expert to evaluate your farm to determine whether or not the habitat is suitable for rhinos.
2. Have a poaching risk analysis done by the Endangered Species Protection Unit of the South African Police Service.
3. Apply to the provincial nature conservation authorities for an exemption certificate for your animals.
4. Determine the origin of the animals you want to buy, as well as the credentials of the game catcher and transport operator.
5. Ensure that your ranch is ready to receive the animals (read the chapter on relocation).



2 Why rhino ranching?

Tourism

The rhino is one of the Big Five, and very popular as a photography subject with foreign tourists on an African safari. Certain characteristics of the white rhino make it more sought-after for tourism than the black rhino. White rhinos occur in small groups and are a higher density species than the black rhino. White rhinos can be kept on smaller areas, and in higher numbers, thus making them cheaper to maintain than black rhinos. The purchase price of white rhinos is also less than that of black rhino, which are gravely threatened. White rhinos prefer open grassy savanna, which facilitates viewing them. They are territorial and will tend to occur in a specific area. Tourists on hiking trails can track them relatively easily. As they tend to be non-aggressive, white rhinos are ideal for tourism.

Trophy hunting

Trophy hunting is a specialised form of tourism through sustainable wildlife utilization. Even though hunting is not ethically or morally acceptable in some communities, it is the reason why a white rhino bull is worth more than R100 000 today.

Trophy hunting has the following disadvantages:

- It creates confusion among armchair conservationists. Ranchers allow hunting while conservationists raise funds for rhino conservation.
- Cows may be hunted if there is a shortage of bulls. Cows may be bought at auction at a lower price, resulting in a greater profit if hunted. As a management procedure, cows offered at official auctions should have the tip of the horns cut off. Old cows can be offered for trophy hunting and need not have the tips of their horns removed. As more breeders enter the field, the price of breeding stock will decrease, while the price of bulls will increase due to the hunting pressure on available trophy animals.

Trophy hunting has the following advantages:

- It is a means of getting rid of surplus males. An overpopulation of males results in fighting and mortalities among breeding stock. Bulls competing for mating with a cow may injure or trample small calves.
- During 1997 rhino hunting netted R100 000 (US$25 000) per hunt. It is estimated that 50 to 100 animals are available for hunting every year, earning the country R7,5 million.
- A small percentage of animals is utilized (see Table 6, page 51) compared to the population which is conserved. Hunting prices are linked to breeding stock that have a relatively higher value, resulting in a good financial return to the farmer (Table 6).

Conservation

Rhino conservation is of national importance and incurs high costs to the taxpayer. The estimated costs are US$200 per square kilometre per annum, or US$420 per rhino per annum. This is a difficult concept for politicians in developing nations to convey to the electorate: why is money allocated for wildlife conservation while people are starving?

The role of the game rancher in South Africa and Namibia is unique, as they

are the only countries in Africa where ownership of the animals vests in the land-owner. At present, 20% of the rhinos in South Africa are privately owned, which emphasizes the role of game ranchers in conservation.

Artwork of a white rhino at Mlilwane Game Reserve, by Zakkie Eloff (private collection, Dr H Ebedes). This rhino was one of the first four white rhinos to be re-introduced in Swaziland in 1968 — a hundred years after they had become extinct in that country.

Darted in an area the truck cannot reach, a tranquillized rhino can be led to the loading truck by careful manipulaton of the dosage.

Above: There's nothing like a refreshing mud-bath!
Below: Rhinos have a strong preference for grass veld on doleritic soils and, given the choice, will avoid sandy soils.

3 Habitat requirements

Nutritional requirements

During the rainy season, short grasses are the most important feed source, provided that they remain green. Examples of such grasses are *Panicum* species, *Urochloa* species, *Digitaria* species and *Sporobolus* species. Shade-loving grasses are utilized at the start of the dry season, as long as they are still green. During the dry season, rhinos exclusively utilize medium to tall grass veld, of which rooigras *Themeda triandra* is the most important. Rhinos avoid turpentine grass (*Cymbopogon* spp.) as it is an aromatic grass smelling of turpentine, as well as three-awn grasses (steekgras, *Aristida* species) due to their low nutritional value. Tall grass veld at the foot and lower slopes of hills and ridges is utilized first, and rhinos tend to graze on plateaux as the dry season advances. Rhinos have a strong preference for grass veld on doleritic soils and, given the choice, will avoid sandy soils (see photo opposite).

Water requirements

During the rainy season, when there is an abundance of freely available water, rhinos will drink twice a day. During the dry winter season, rhinos will drink every second day (on average) and may even go four days without water. The animals enjoy taking a mud-bath during the hottest time of the day, and will often wallow in the mud for hours on end. During these rest periods, terrapins may pick engorged ticks from the sleeping rhinos. Rhinos should take in about 3% of their body mass in water daily. In the heat of day rhinos usually lie in the shade of leafy trees.

In summary

White rhinos prefer open savanna and avoid areas with low, dense shrubs. Sufficient shade and permanent open water is important; rhinos originally occurred naturally in areas where rainfall exceeds 450 mm per annum. Two activity peaks occur in the wet season, i.e. early morning and late afternoon,

when the rhinos graze. During the hottest part of the day they rest in high-lying areas, seeking a breeze. During the dry season more activity is devoted to moving between watering points.

Practical implications for the rhino rancher

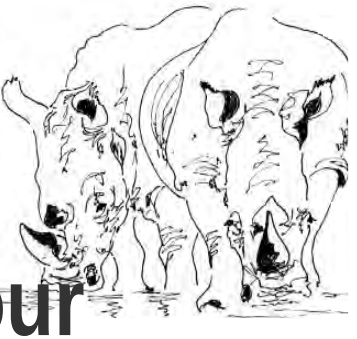
- To avoid erosion, artificial watering points should be provided in natural water courses.
- Where old grass tends to accumulate during the winter months, a sound veld-burning programme should be followed.
- Prevent competition with other grazers, e.g. buffalo and zebra.

An outstanding breeding bull, with owner Mr S du Toit (right) and game capture expert Mr C Mostert (left).

Hyaenas chewed off the ears of the rhino on the left, when it was a calf.

4

Social behaviour



Rhino bulls inhabit home ranges of 75 ha to 12 000 ha, depending on the density of the population. Home ranges are demarcated by dung heaps and urine marking sites. These ranges do not overlap with those of other dominant bulls and are called 'territories'.

Bulls which are subordinate to the dominant bull may occur in the latter's territory. When they meet, the subordinate bull will flatten his ears as a sign

of submission, after which the dominant bull will move away. Bulls may leave their territories to visit watering points. Two dominant bulls meeting at the boundary of their respective territories may stand horn to horn, 'glaring' at each other. Such rituals may last longer than an hour and are not accompanied by fighting. When the bulls move away from each other, their horns are rubbed on the ground in a swinging motion. When a territory is taken over from a dominant bull, serious fighting may occur. Afterwards, the

displaced dominant bull's behaviour will change to that of a subordinate bull, i.e. he will stop marking with dung or urine and will flatten his ears and make bellowing sounds.

Home ranges of cows are up to four times larger than those of bulls (up to 1000 ha). It follows that cows move through the home ranges of bulls without aggression occurring. Cows' home ranges overlap. When a cow calves, her previous calf (2-3 years old) is driven off. Such subadults may join other young animals of the same age and frequent the same area, known as the 'club house'. Some youngsters may also associate with cows without calves at foot. Two cows with calves may form an association, resulting in small herds of 4-5 animals. Cows with newborn calves remain solitary until the calf is two months old. During that time the cow will prefer taking cover in thickets.

Practical implications for the rhino rancher

- To prevent losses due to fighting between bulls, 500 ha should be allocated to each breeding bull on farms smaller than 1000 ha (territorial bulls comprise about 10% of the total population).
- The ideal minimum number for re-establishing a rhino population on a game ranch is one dominant bull, one subadult bull, two cows and two heifers.
- Do not release young animals where adults have already been established, as dominant animals may kill the youngsters (see photo p. 10).

Opposite page: White rhino bull demarcating his territory with a spray of urine.

This page: Coprophagia in a white rhino calf is not uncommon— the animal is eating droppings of blue wildebeest.

‘Rhinos on the move’ — Aquarelle by Alan Ainslie.

Above left: Dark-coloured dung heaps are used as territorial demarkation by rhinos. This is an important aid in the social structure and helps to prevent territorial fighting.
Left: Rhino bulls sometimes use angled tree trunks such as this one as masturbation trees. This phenomenon has been observed not infrequently but does not seem to be of any management significance.

5 Reproduction

Mating behaviour

The presence of mature bulls near cows during the wet season (November to February) is an indication that the cow is in oestrus. In zoos it was found that the oestrus cycle is 27-44 days, while the oestrus period lasts 1-3 days. Bulls accompany cows during the pre-oestrus period, which may last 7-14 days. The onset of the oestrus period is characterized by the bull approaching the cow and making hiccuping sounds; the cow initially repels his advances. Gradually the cow becomes tolerant of the bull, who rests his head on her rump. This is followed by several unsuccessful mating attempts before the bull mounts the cow. Copulation lasts 15-30 minutes, during which the bull ejaculates repeatedly. Rhinos may copulate repeatedly during the oestrus period. Bulls remain with cows for 2-6 days after oestrus. If the cow has not conceived, she will show oestrus again after about 30 days. The gestation period is 16 months. The birth mass of a calf is about 40 kg.

Life cycle

Detailed observation has shown that calves less than two months old suckle hourly, while suckling frequency in older calves is once every 2,5 hours. Suckling bouts last for about three minutes. The interval between suckling bouts increases between 12 and 18 months; it would appear that lactation ceases during the third or fourth month of the subsequent pregnancy. Intercalving intervals differ regionally: Umfolozi 2,63 years; Kruger National Park 2,7 years; Matobo 2,85 years and Kyle 3,45 years. The population increase is 6-8% per annum under natural conditions, but can go up to 15% in populations with a wide sex ratio. A rhino cow can breed between the ages of 6 and 40 years, and produce 14 calves during her lifespan.

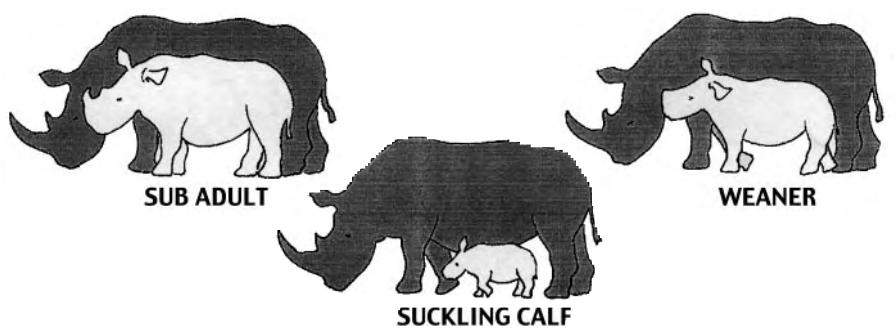
A 10-day-old calf caught by a leopard had lucerne leaves in its stomach. At one year of age calves are grazing well; they are weaned by 18 months. Calves leave their dams at age 2 to 3,5 years and join up with other youngsters or single cows. In Umfolozi, rhino heifers show first signs of oestrum

at about 4 years, but their first calves are usually only born when they are 7 years old. Although bulls will mate earlier in the absence of a dominant bull, mature bulls usually only breed once they are older than 12 years.

Practical implications for the rhino rancher

- Give lucerne as a supplementary feed if the rainfall is less than normal, in order that cows coming into oestrus may conceive.
- A high concentration of bulls attempting to mate with a cow in oestrum may lead to trampling of or injury to calves.
- The tips of the horns of dominant breeding bulls which are not hunted can be sawn off to limit injuries to cows and calves.
- Estimated age of calves under field conditions (see figure 2 below):
  Shoulder height of calf compared to its mother —
  1/4 still nursing
  1/2 weaned
  3/4 subadult
  4/4 adult
- The blood of cows can be tested for pregnancy. The progesterone levels in the serum can be determined at the Department of Theriogenology of the Faculty of Veterinary Science, University of Pretoria, Onderstepoort, to find out if the animal is pregnant.

Figure 2: Estimating the ages of rhino calves reliably in the field:



6

Management

Identification techniques

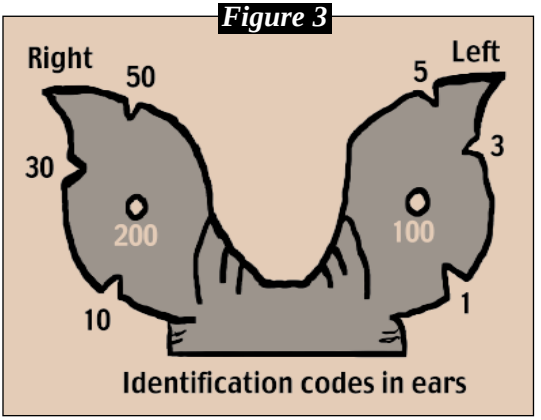
This is the first step in the successful monitoring of individuals. The rancher should be able to identify every animal at a distance in the veld in order to ascertain the reproductive success of individuals.

Ear tags
This technique is generally used to identify individuals in bomas, where large numbers are offered at auction. Brightly-coloured ear tags are clearly visible, but they may be torn out and the written numbers may fade. This should therefore be regarded as a temporary identification measure. Many tourists object to seeing animals with ear tags.

Ear notches
Notches in the shape of small triangles 2,5 cm x 2,5 cm x 1,5 cm can be carved into the ear with a sharp razor or scalpel blade. Artery forceps can be applied for 4-5 minutes to stem bleeding; the same can be achieved by applying "steel drops" ("staaldruppels") or superglue. The piece of ear can be frozen for future DNA analysis, to prove the identity of the individual.

The left ear is used for ones and the right ear for tens. Various combinations are used to denote the animal's number. Thus: left bottom is 1, middle is 3 and top is 5; right bottom is 10, middle is 30 and top is 50. A hole in the left ear denotes 100, and one in the right ear 200. For example: Rhino number 18 will be numbered bottom right and left top and middle.

Figure 3



Identification codes in ears

Top: Exercise camp adjacent to a boma, with a group of animals which know each other.
Above: This rhino became entangled in fencing material which acted like a wire snare and drew so tight that the animal could not drink water.

The ear notch method is permanent; if applied correctly, it will not affect the tourism potential of the animals. It is recommended as the best field identification method.

Microchips
There are two types on the market: Trovan and Unidata. A small microchip is inserted by means of an applicator on the right-hand side of the tail base, where the skin is thinnest. The method is permanent, but the chip may become damaged, especially when bulls butt cows with their horns in the vaginal area. The chip can only be read from a distance of 20-30 cm, and this is therefore not a field identification technique. Each chip has a unique code. Microchips are important in cases where neighbours dispute ownership of specific animals.

Microchips can be inserted in the base of the horn to identify poached horns. This technique has limitations in the long term as the microchip will grow out with the horn.

Drill a hole 3 mm in diameter and 30-40 mm deep at the base of the horn. Insert the microchip by means of the applicator and fill the hole with silicone.

Practical implications for the rhino rancher

- Field identification of individuals is important in collecting biological data on the population, for instance a cow's estimated calving dates in order to calculate intercalving periods.
- Unproductive and old animals can be identified and utilized for hunting.
- To confirm ownership in court cases, where ownership of individual rhinos is being disputed by neighbours.

Rhino censusing

Annual aerial censuses are recommended for areas larger than 5 000 ha, to ascertain the number of rhinos on the property. Rhinos are wary of helicopters and may move off relatively long distances in short periods. They can therefore cross various census strips, resulting in over- or under-censusing of the population. Animals marked with ear codes are readily identifiable from the air, thus preventing over-censusing. During winter, water-hole

counts can be conducted for 48-hour periods when the moon is full. Animals with ear codes are easily recognisable with binoculars.

Genetic management

A clear distinction must be drawn between genetic management of the total Southern African rhino population, and those belonging to individual farmers. Inbreeding may result in negative characteristics such as reduced fertility, increased calf mortality, weaker animals, etc. To maintain the inbreeding factor at less than 1% requires 50 breeding animals, and is determined by the sex ratio.

The effective population size can be calculated using the following formula:

$$Ne = \frac{4N_m \times N_F}{N_m + N_F}$$

Where

Ne = Effective population size
N_m = Number of breeding bulls
N_F = Number of breeding cows

Guidelines set by geneticists for the conservation of large populations:

Effective population size	≥	500
Total population size	≥	2 500
Number of subpopulations	≥	10
Size of each subpopulation	≥	100

The above-mentioned figures illustrate the fact that large populations are required to maintain genetic diversity.

Practical implications for the rhino rancher

- Replace breeding bulls after six years, before they mate with their own offspring. Adult bulls can be hunted or exchanged with other rhino ranchers (bulls kept by a syndicate).
- Purchase bulls and cows from different sources when starting the rhino ranching operation.
- Limit mortality to ensure maximum population size.
- Each ranch should have a minimum of two breeding bulls.

Veld management

The basic habitat can be summarised as:

- A relatively flat area with sufficient short grass,
- sufficient open water and
- thick scrub to shelter in (cows with calves).

The above-mentioned summary shows that the bushveld areas of Northern and Northwest Provinces, Mpumalanga and KwaZulu-Natal are ideal habitat for white rhinos. Mountainous areas of the Waterberg do not constitute good habitat. Overgrazed cattle ranches with bush encroachment are also not suitable. Some nature conservationists are of the opinion that white rhinos survived in Zululand at the turn of the century (1900) due to the open grassveld habitat created by Zulu people collecting large amounts of fire-wood.

Bush clearing is an important management principle on overgrazed land. Bush should be cleared on deep soils, while bush for shelter should be retained on gravel slopes. Level veld should be burned to remove old, dead material and create shorter grass veld.

Management of disease

This only applies where free-ranging rhinos may contract diseases, primarily infectious diseases. Rhinos should preferably be vaccinated in areas where anthrax occurs (please note that the vaccine is not registered for wildlife in terms of Act 36 of 1947).

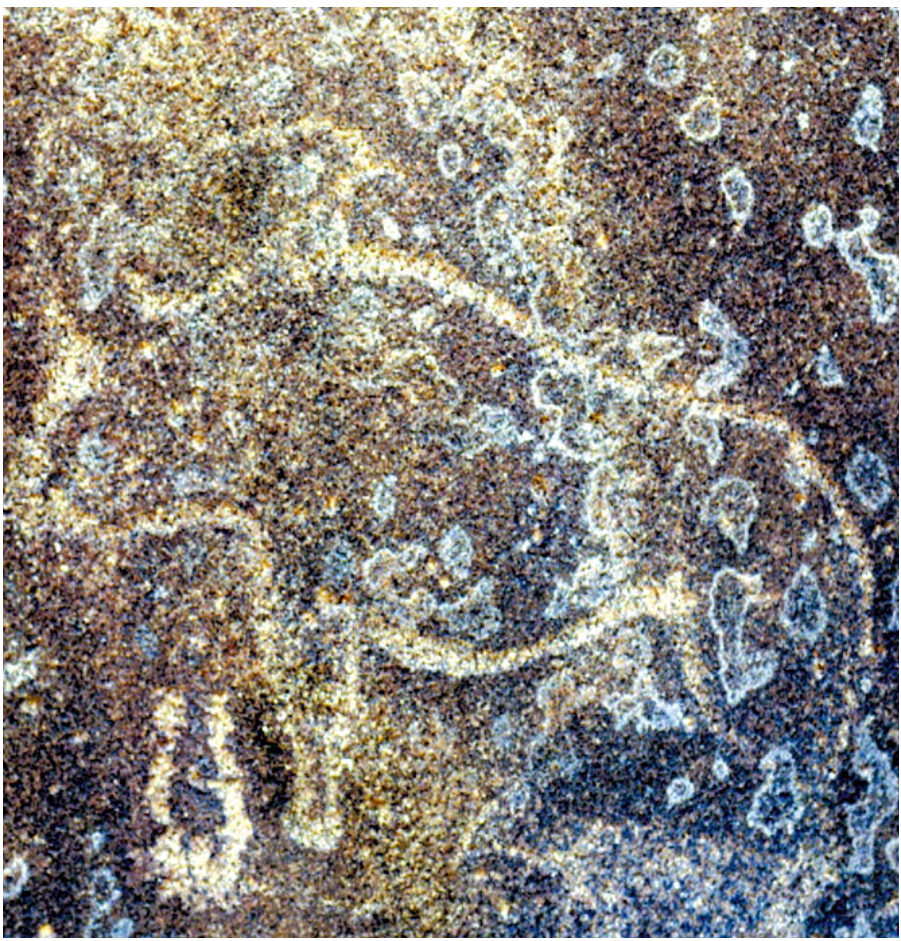
It is important to keep water-points clean. Carcasses should be removed from the water. Botulism may be a problem; it was implicated in the deaths of 46 black rhinos in KwaZulu-Natal. The rhinos died within 500 m of the water, after showing paralysis of the forelimbs; the post-mortem examinations were negative.

Tuberculosis has not been reported in white rhinos under natural conditions. Since there is as yet no vaccine or treatment for this disease in rhinos, it is imperative that a diagnostic test should be developed as a matter of urgency in order to identify positive animals.

Algae (*Microcystis aeruginosa*) poisoning has been suspected in white rhinos; the dam from which the rhinos drank was infested with these algae.

Controlled watering points, where the overflow of artificial drinking troughs runs into earthen pools, are ideal mud wallows on a game ranch.

Indeed, the management of watering points forms an integral part of disease management on a game ranch. Where valuable animals such as rhinos are involved, common sense dictates observing the basic requirements of sound hygiene!



7 Capture

Introduction

White rhino capture is a specialized process which should not be tackled by lay persons. As rhinos are expensive and valuable, the use of a helicopter and an experienced wildlife veterinarian is recommended when they are immobilized (see Appendix II). After darting, a rhino can trot for five minutes before the drug starts taking effect. Rhinos can cover a few kilometres during that time. They also tend to seek shelter in thickets. A helicopter facilitates finding the animal as soon as possible, so that the antidote can be administered without delay. The helicopter can also be used to herd the animal to a suitable area which is accessible to the capture team on the ground.

Drugs

Rhinos typically goose-step when the immobilizing agent starts to take effect. Before the full effect is felt they may trot a few kilometres!

TABLE 1: RECOMMENDED DOSAGES FOR IMMOBILIZING WHITE RHINOS

Age	Drug	Dose (mg)
Adult bulls	M99	4-5
	Azaperone	120-150
	M5050	8-12
Adult cows	M99	3-4
	Azaperone	90-120
	M5050	6-10
Subadult animals	M99	1-3
	Azaperone	30-90
	M5050	2-8
Calves	M99	0,5 -1
	Azaperone	15-30
	M5050	2-3

Warning: Do not use Hyoscine in cocktails (see page 35)

Immobilizing and tranquillizing agents

Rhinos are immobilized with M99 (etorphine hydrochloride) and Stresnil (azaperone). M5050 (diprenorphine) is the antidote used to revive the animal following immobilization.

Nalorphine can be administered when the respiration rate drops to less than 6 per minute, or when the rhino lies in an area inaccessible to vehicles. The animal is blind-folded, and 30 mg nalorphine is administered to the animal, after which it can be led to the crate. As a rule of thumb, 30 mg azaperone (tranquillizer) is used for every 1 mg M99 (immobilizing agent). **NEVER** use M99 by itself, as rhinos are very sensitive to morphine; their blood pressure may rise to dangerous levels, leading to mortalities.

Warning: M99 is 10,000 times more potent than morhine and is dangerous – even by absorption through broken skin! The use of this drug and other drugs in this category are strictly controlled by law.

Other medicines

Antibiotics
Long-acting penicillin preparations (approximately 25 mℓ) can be injected, especially near the dart wound, to prevent abscess formation due to infection of the wound. NEVER administer tetracyclines to rhinos, as this can lead to abscess formation and disturbances of the gastro-intestinal tract, which may be fatal.

Anti-inflammatory compounds
Non-steroidals such as Finadyne are an excellent choice. It is important to treat nervous, young animals which may fight the crate. The sinuses are situated relatively deep under the horn, and repeated butting with the horn may result in sinusitis. **Never** administer corticosteroids to adult cows; this could lead to abortion.

Other compounds
- Eye ointment to protect the eye from drying out (ISEE)
- Respiratory stimulants to increase the respiration rate (Dopram)
- Emergency drugs
  - Heart-beat stimulant (adrenaline)
  - Local anaesthetic (lignocaine)
  - Stockholm tar and/or Acriflavine when a horn breaks off.

Precautions

- Don't capture rhinos if the ambient temperature exceeds 25°C. Try to prevent rhinos from running long distances on hot days. Plan to capture rhinos early in the morning, when it is cool.
- Take sufficient water (minimum 40ℓ) to cool the animal; spray by means of a knapsack pump.

- Get the animal to its feet as soon as possible. Temporary paralysis of the nerves can occur ('pins & needles'). Dog-sitting is especially dangerous; roll the animal onto its side if the hind limbs are paralysed.
- Cattle prodders, ropes, blindfolds and ear stoppers (rags) are necessary to control the animal.
- Dart wounds can be treated successfully with mastitis preparations.
- Do not inject large volumes of irritating substances into the neck of a rhino due to be held in a boma. The pain when the animal moves its neck or lifts its head will discourage feeding.
- Pour-on compounds (0,5% solution, rather than the standard 1%) can be used for tick control, but should preferably be applied after the animal is feeding well in the boma. NEVER use Triatix (Hoechst Roussel Vet) on rhinos, as it may lead to ileus of the small intestine.
- Avoid using Hyoscine (Kyron) if the animal is to be released directly into hilly country, as the drug may cause vision disturbances for up to 30 days after administration.
- Restrict spectators at the capture process to the bare minimum.
- Administer long-acting tranquillizers such as Trilafon, Clopixol-Acuphase or Perphenazine enanthate if animals are to be released directly in the veld.
- Do not immobilize animals which are in poor condition during the late winter. The neck muscles (nuchal hump), hip/pelvic muscles are good indicators of the condition of the animal. Ribs of rhinos are always discernible; this is therefore not a good method of assessing condition under field conditions.

Physiological values

Rectal temperature varies from 34,5°C to 37,5°C.
Respiration rate varies from 6-12/minute.
Pulse is 30-40 beats/minute.
Defecation rate: 5-6 times per day.

Clinical pathology values

Normal values are given in Tables 2 and 3. Total serum protein is higher than in horses, with globulin being the main component (40-70 g/ℓ). These values should be regarded as normal and do not indicate liver disease. The sodium and chloride values are lower than in other species and should not be regarded as an indication of diarrhoea or chronic kidney disease.

TABLE 2: BLOOD CHEMISTRY PARAMETERS OF WHITE RHINOS

Component	Mean Value	Standard Deviation
Albumin g/ℓ	26,1	3,7
Alanine transaminase U/ℓ	8,6	3,7
Alkaline phosphatase U/ℓ	127	33,2
Aspartate dehydrogenase U/ℓ	40	14,6
Chloride mmol/ℓ	94,2	3,05
Creatine kinase U/ℓ	48	14,1
Cortisol mmol/ℓ	26,2	32,4
Gammaglutamyl transferase U/ℓ	7,6	2,8
Lactate dehydrogenase U/ℓ	526	126
Potassium mmol/ℓ	5,4	2,6
Sodium mmol/ℓ	129,6	4,2
Total proteins g/ℓ	92,7	9,0

Source: J van Heerden (In: Penzhorn & Kriek (eds): *Rhinos as Game Ranch Animals*)

TABLE 3: HAEMATOLOGY PARAMETERS OF WHITE RHINOS

Parameter	Mean	Std deviation	Range
Red cell count (x10^{12}/ℓ)	6,17	0,49	5,6 - 6,96
Haemoglobin (g/ℓ)	13,78	1,32	12,1 - 15,9
Packed cell volume	37,60	3,98	33,0 - 43,4
Mean corpuscular volume	61,00	5,26	55,0 - 70,9
Mean corpuscular haemoglobin (pg)	22,37	1,81	20,2 - 25,6
Mean corpuscular Hb conc. (g/dℓ)	36,80	0,75	35,4 - 38,0
Platelet count (x 10^{9}/ℓ)	483	152	255 - 696
White cell count (x 10^{9}/ℓ)	15,14	2,55	11,1 - 19,5
Neutrophils (%)	26,70	9,10	13,0 - 38,0
Lymphocytes (%)	61,20	10,70	48,0 - 79,0
Monocytes (%)	3,40	-	1 - 10
Eosinophils (%)	5,50	-	1 - 12
Basophils (%)	0,70	-	0 - 2

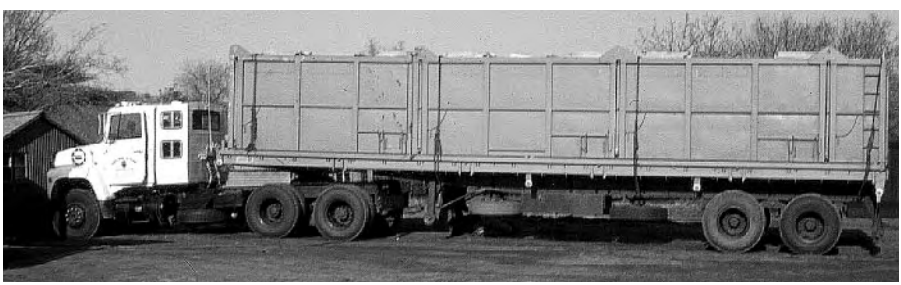
Source: J van Heerden (In: Penzhorn & Kriek (eds): *Rhinos as Game Ranch Animals*)

Transport

- Rhinos should always be transported singly, even a cow and her calf.
- Use long-acting tranquillizers, irrespective of the distance covered, and boma-train animals for journeys longer than 12 hrs (See Table 4).

TABLE 4: DOSAGES OF SHORT- & LONG-ACTING TRANQUILLIZERS FOR TRANSPORTING WHITE RHINOS

	Short-Acting	Long-acting	
Type of animal	**Azaperone** (mg)	**Clopixol-acuphase** (mg)	**Perphenazine** or **Trilafon** (mg)
Yearling	50 -100	-	-
Sub-adult	150	200	200
Adult cow	200	150 - 300	250
Adult bull	250	300 - 350	300

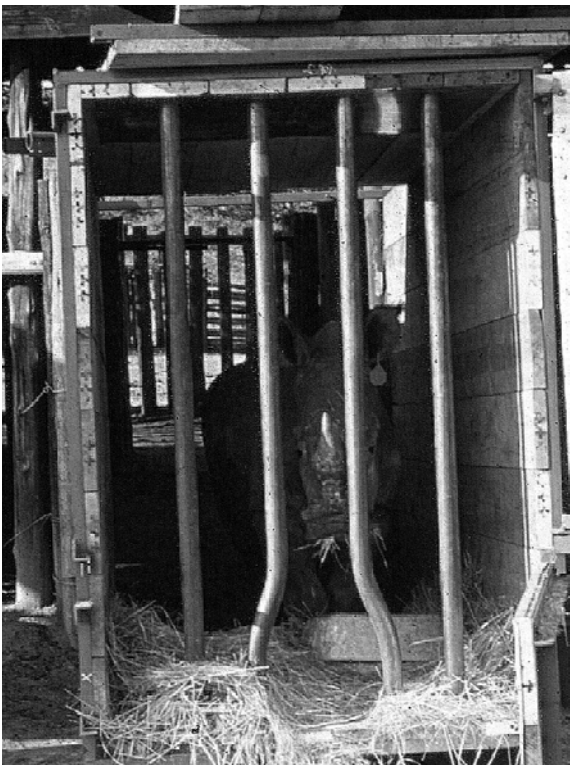


- Use mass-carriers, with single crates placed next to each other. Four to six animals can be transported in this way. It works best with young animals. Adults are broad in the beam, which makes it difficult to get them to move through the adjoining compartments.
- Rhinos are loaded to face backwards; when the driver has to brake suddenly, the horns won't be bumped off and the shock will be absorbed by the hindquarters.
- Crates with vertical bars ±60 cm from the front will help to prevent the horns of big bulls from breaking off.
- Use the 24-hour information service of the Weather Bureau (012 290-

Top: A retrieval crate is used when rhinos are captured in the veld, which allows the rhino to be moved to the mass transport vehicle.

Above: A crate, boma and corridor to the exercise paddock. There is also a raised walkway to enable manipulation, management and observation of the rhinos to take place.

Opposite page: A typical rhino crate. Note the vertical bars, ± 60 cm from the front, which help to prevent the horns of big bulls from breaking off.



3000 and 012 323-8333) to avoid moving rhinos during cold fronts. Avoid transporting rhinos when the minimum temperature drops below 5°C.

- Spray animals with water every four hours during hot weather. This can coincide with stops, when inspection can be carried out.
- Arrange for a light vehicle to accompany the truck, to summon help in case of a breakdown.
- The truck drivers must be experienced. The truck should be driven in such a way that if a glass of water were placed in the crate, it would not be overturned.
- There should be radio and telephone communication between the truck and the capture unit. The driver should also have the buyer's telephone number.
- Pole syringes are required for administration of short-acting tranquillizers (Azaperone) to animals becoming restless.
- Make sure that the truck is equipped with a cattle prodder, to get animals lying in a bad position to stand up; a torch (flashlight) should also be available.
- Standardize wheel sizes of the truck and the trailer (three spare tyres are essential for long distances).
- Closed-circuit TV can be used to observe the animals during transport.

Please refer to the crate dimensions provided in Table 5 (next page).

TABLE 5: INTERIOR MEASUREMENTS OF SINGLE CRATES FOR TRANSPORTING WHITE RHINOS

Crate no.	Age of animal	Height (m)	Length (m)	Width (m)
1	Yearling	1,4	2,6	0,9
2	Subadult	1,6	3,0	1,1
3	Adult	1,8	3,3	1,3
4	Large bull	2,2	4,0	1,5

Adapted from: P Rogers (In: Penzhorn & Kriek (eds): *Rhinos as Game Ranch Animals*)

Boma management

The reasons for taming white rhinos in bomas are the following:

- To prepare animals for auction.
- To prepare animals for export to zoos and safari parks.
- Animals have to be transported over distances exceeding 1 000 km.
- Animals originating from large reserves, destined for game ranches which do not have electric fences, need to be acclimatized.

Problems

- Keep the boma open after release and maintain the supply of water and feed; rhinos often return to the boma to feed and drink.
- Young animals adapt more readily than adults.
- Adults tend to go on ‘hunger strikes’ (1 in 5 animals refuse feed).
- Rhinos will try breaking out for the first 7 days - ‘bomas have to be strong enough to break in the animals’.
- Animals may see people moving about outside the boma and charge, sometimes losing a horn by butting against the pole fence or hooking the horn between the poles.
- Boma staff only should be allowed in the vicinity until the animals are eating well.
- Disturbances of the gastro-intestinal tract may occur, such as diarrhoea, colic and constipation.
- If there is no mud wallow in the boma, the skin loses condition.

Precautions

- Meet the animal's social requirements. White rhinos are gregarious; animals should therefore have 'company' in the bomas by seeing others through the pole fences. Groups of individuals knowing each other should be placed in the same boma, to maintain social bonds. Some cows and larger calves may fight.
- Stimulate the animals to defecate as soon as possible. This can be done by placing the dung of strange rhinos in the boma. The usual pattern is for rhinos to defecate on the first two days, and then stop for a few days until they have started eating again.
- Maintain good hygiene by removing the dung regularly. A layer of sand in the boma will absorb urine.
- Create a mud wallow in one corner of the boma, if the boma is large enough. Mud seals and prevents maggot infestation of small wounds.
- Provide sufficient shade in the form of a roofed-over area.
- Provide sufficient clean drinking water daily. An adult animal requires up to 50ℓ of water per day.

Feeding

- Using long-acting tranquillizers on rhinos in bomas may suppress the animals' appetite.
- Provide green veld-grasses such as *Panicum maximum* (Guinea grass; witbuffelsgras). Crushed pods of *Acacia tortilis* (umbrella thorn; haak-en-steek) stimulate animals to start eating sooner, probably due to the scent and taste.
- Feed pellets with high doses of coccidiostats (Salinomycin) **should be avoided** as this substance is highly toxic to rhinos.
- Game cubes (antelope cubes) which include cotton products will contain gossypol, which is potentially toxic to single-stomach animals such as rhinos.
- Horse cubes are the ideal concentrate for boma feeding. A total of 2,5 kg can be fed twice a day to adult rhinos.

- Rhinos refusing to feed can be stimulated by scorching dry grass and dousing it with water. Rhinos like grazing on newly-burnt veld, and this method will sometimes stimulate them to start feeding.
- Rhinos feed actively at night; sufficient fresh feed should be provided in the late afternoon.
- Young rhinos are coprophagous – they eat faeces to obtain vitamins produced in the large intestine (see photo). A vitamin supplement such as Vitastress can be added to the drinking water.

- Good quality hay is essential. Teff and lucerne can be mixed; an adult rhino requires one to two bales of roughage per day.
- Hay racks or troughs and water troughs should not be close together, to prevent spilling of hay into the water.
- Mouldy hay can cause colic and should be avoided.
- Constipated animals can be stimulated to defecate by adding magnesium sulphate (Epsom salts) to the drinking water. Dosages are: 500g/50ℓ for an adult bull; 400g/50ℓ for an adult cow; 200g/50ℓ for subadult animals and 50-100g/50ℓ for young animals. Rhinos will sometimes refuse water with added electrolytes, due to the taste and smell. Constipation is usually caused by poor quality hay.
- Do not deworm rhinos, as some of the worms may have a symbiotic relationship with the host. If bots (parasitic insect larvae) are a problem, rhinos should be treated.

Release

- It is advisable to electrify the fences of game ranches before rhinos are released (check the requirements set by the provincial conservation authorities) – see Appendix III.
- Rhinos may become entangled in camp fences. Rhinos unaccustomed to camp fences should not be exposed to such situations (see photograph on page 27).
- Large dongas and cliffs should be fenced off.
- Corners of camps should be reinforced with cables. Drums cut in half lengthwise and filled with water can be placed here.
- After release, animals tend to move back in the direction of their point of origin, and will therefore first encounter fences on that side of the

property. For instance, a rhino from the Kruger National Park released in the Thabazimbi District will tend to move eastward.

- The release site should be as close to the centre of the property as possible.
- The off-loading ramp should be 1,2 m high and 5 m wide, with a slope of 35°. Sufficient sandbags should be available to fill any gaps between the truck and the ramp.
- The off-loading sites should not be closer than 200 m from open water. Rhinos under heavy sedation may be startled during the off-loading process and stampede into the water.
- Use long-acting tranquillizers where animals are captured and released from veld to veld (see Table 4).
- Restrict human activities on the ranch for the first 14 days after release of the rhino. Don't disturb the animals by boundary patrols. Move away immediately, to prevent startling the animals and causing them to break through the fence.
- Do not off-load rhinos at night, especially if there is no moon; they may fall into dongas or over cliffs. Rhinos can be off-loaded into dimly lit bomas.
- Restrict the number of spectators to the minimum. After being transported, rhinos are aggressive and can overturn vehicles with spectators in the vicinity.
- Inform your neighbours in writing if this is the first rhino introduction onto your property.

GENERIC AND TRADE NAMES OF DRUGS

Trade Name	Generic Name	Manufacturer
Clopixol / Acuphase	zuclopenthixol acetate	Lundbeck
Dopram	doxapram hydrochloride	Continental Ethicals
Finadyne	flunixin meglumine	Centaur
ISEE	vit. A, chloramphenicol	Logos Agvet
Lignocaine Inj.	lignocaine hydrochloride	Milborrow
Stresnil	azaparone	Janssen
Trilafon LA	perphenazine enanthate	Scherag
M99	etorphine hydrochloride	Reckitt & Coleman
M5050	diprinorphine	Reckitt & Coleman
Vitastress	vitamin combination	Panvet (Sanvet)
Nalorphine Inj.	nalorphine hydrobromide	Kyron

8

Mortalities

Natural causes

Droughts
White rhinos depend on open water and suffer during droughts. Lucerne can be given as supplementary feeding on game ranches. White rhinos are aggressive at feeding sites and dominant animals may injure others. There should be ample feeding sites and sufficient bales distributed per site.

Space the bales widely at each feeding site, to reduce aggression between animals. Animals may become stuck in the mud when watering points dry up. Daily visits to such watering points are necessary during droughts to rescue any animals that are stuck.

Floods
White rhinos are poor swimmers and can be trapped on islands in large rivers during floods. The only way of rescuing these animals is by darting and airlifting them by helicopter.

Fire
Incidences have been recorded of rhinos killed by lightning or burnt to death in veld fires, especially where the animal was trapped against a fence.

Terrain
In mountainous areas rhinos have fallen over cliffs. This is an important factor to remember when aerial censuses are undertaken. During the winter months, rhinos tend to prefer plateaux; this coincides with the time when aerial censuses are taken.

Predation
Lions can kill young animals and cause such injuries to adults that they have to be destroyed. A case was documented where a leopard had mastered the technique of killing new-born calves by severing the jugular vein in the neck and waiting for the animal to bleed to death before eating it.

Hyaenas have also been known to catch rhino calves. Short ears and tails are an indicator of this problem (see photograph on page 19). Crocodiles can catch small calves and should be removed from dams on the ranch if rhino ranching is envisaged.

Fighting

- **Intraspecific**
  Fighting between territorial bulls accounts for 50% of mortalities. If young animals are introduced onto properties where rhinos occur, territorial bulls may injure or kill the new animals. A natural mortality rate of 6% can be expected for young rhinos.
- **Interspecific**
  On small conservation areas, white rhinos and elephants may fight. Thirteen white rhinos were killed by young elephant bulls in Pilanesberg Game Reserve. A case has also been recorded of a hippo attacking and biting rhinos at a feeding site (see photograph on page 34). The hippo was eventually killed by the territorial rhino bull. Fights may also break out between white and black rhinos – a case of a white rhino bull killing a black rhino bull is on record.

Diseases
The common diseases are discussed under Disease Management and Boma Management. A septic condition of the oesophagus caused by the bacterium *Streptococcus equisimilis* has been recorded under stress conditions (e.g. harsh winters) in two to three-year-old, free-ranging white rhinos. The condition was invariably fatal as the animals did not respond to treatment.

Unnatural causes

Three types of illegal hunting occur in Africa:

1. **Hunting under conditions of warfare**
   During 1972, war-related hunting caused the decline of the northern white rhino from 1,300 to 100 individuals.
2. **Internal hunting**
   Local inhabitants or staff are responsible.
3. **External hunting**
   Large-scale and organised hunting by people from outside the area.

Factors contributing to illegal hunting:

- **Corruption**
  Politicians and middle-men establish a network functioning illegally and maintained by corruption.
- **Poverty**
  Local populations live on the boundaries of large game reserves. Approximately 50% of the population under 18 years will be unemployed during the next decade. These inhabitants know the veld and animals in their area, which do not provide them with an income. During the late 1980s, a poacher earned US$30,00 for a pair of rhino horns in the Luangwa Valley. This was equivalent to two months' salary. The poacher earns 7,2% of the wholesale price and 0,4-5,0% of the retail price of the product.
- **Arms**
  After decades of warfare in various African countries, the continent is awash with AK-47 rifles. Today an AK-47 can be exchanged for a carton of cigarettes.
- **Media**
  The media exaggerate prices paid for rhino products on the black market, thereby drawing the attention of impoverished people to an easy way of making money. The myth of rhino horn being an aphrodisiac is also exploited by the media for sensation. The Chinese use rhino horn exclusively as an anti-inflammatory agent, while Yemenis use it to carve élite dagger handles.
- **Market**
  A survey conducted at pharmaceutical factories in China in 1989 revealed 9 875 kg of rhino horn in their possession. The factories process 650 kg per annum. On average, Chinese doctors use 75g/doctor/annum. One should bear in mind that the Chinese have been using rhino horn for two thousand years, definitely before the advent of Disprin. Why would they want to change their remedies? How will CITES, as a law drafted by the West, get them to change their opinions?

In summary

The wise words of Churchill can be quoted: 'If you stop a free market, you create a black market'. What can the game rancher do to protect his rhinos?

- Create a positive attitude amongst your neighbours.

POACHERS! WHAT TO DO:

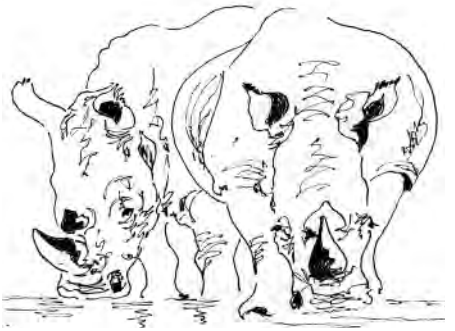
1. **Regard all dead rhinos as having been poached.**
2. **The person who found the carcass must, if possible, remain at the scene.**
3. **No other persons must be allowed within 200 m of the carcass.**
4. **Nothing must be disturbed at the scene of the crime.**
5. **No-one may walk around at the scene of the crime.**
6. **The incident must be kept confidential — no personnel, neighbours or the press must be informed until the investigation has been completed.**
7. **All eye-witnesses must be kept close to the scene until the investigator arrives.**
8. **The number of rhino on the property must be kept secret from personnel and from the public.**
9. **In the case of a strike by security or other personnel, an alternative plan must be put into operation to protect your rhinos.**
10. **Immediately contact the local Nature Conservation Dept. and the ESPU at:**

012- 803 9900/7

- Ensure that staff are adequately trained to control poaching. There are organizations which provide such training.
- The author was assured by black nature conservationists that there are sangomas with *muti* strong enough to protect the lives of rhinos.
- Have the rhinos dehorned by an expert.
- Export live rhinos to China and teach the Chinese how to farm with rhinos.

9

Politics



The problem of rhino conservation in Africa is that First-World laws are being imposed on a Third-World situation. Western nations are trying to save animals' lives through legislation, while ignoring the people starving next to game reserves, the corruption of politicians and middle-men, the poor salaries of nature conservators tasked with protecting the animals, and an age-old tradition of Chinese pharmacology.

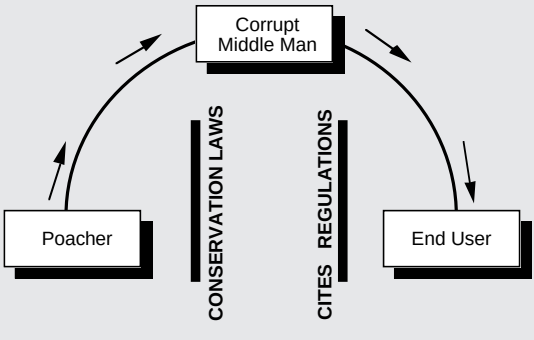
The argument is often mooted that to make rhino products available on the open market will lead to further poaching. Has the CITES ban been effective? Since the imposition of the ban in 1981, the number of black rhinos in Africa has decreased from 12 750 to 2 550 individuals — representing a decline of two rhinos per day!

"Green" organisations fear that, if the trade in rhino horn is legalized, trade in ivory will also have to be opened up. The reality is that an elephant has to be killed for its ivory to be harvested, while a rhino's horn can be cut off while the animal is anaesthetised, after which the rhino is brought around and can walk away. Why may we shear a sheep's wool, but may not cut off

compressed fibre in the shape of rhino horn? The truth of the matter is that fund-raising for conservation has become a business in which less than 10% of the funds generated are actually spent on the animals.

These organisations see to it that blood and guts feature prominently in the media when a hunter shoots a rhino, or maybe a "canned" lion. Why are their audited statements not submitted to their donors, let alone published in the media?

Figure 4: Black marketing channel



What would a New Yorker say if a South African rhino rancher tried to dictate how the bison population in Yellowstone National Park should be managed?

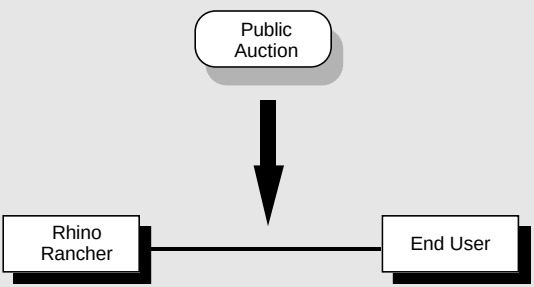
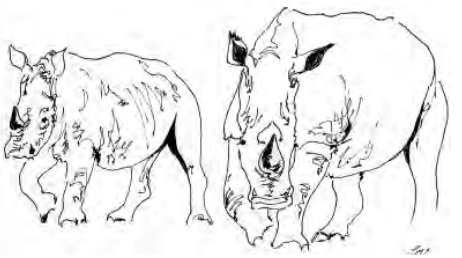


Figure 5: Free marketing channel

The "Green Syndrome" out there forgets that the rhinos on South African game ranches are the legal property of their owners. The animals were acquired at auction for large sums of money and should be managed as a business.

Why can't a white rhino bull be selected for horn growth in the same way that a Merino ram is selected for wool production?
Why can't we export live rhinos to China and teach the Chinese to farm rhinos?
If it hadn't been for their silk, the Chinese would eat silkworms.

10 Finances



The costs of conservation

A cost analysis of an anti-poaching unit in Zimbabwe at 1 man /50 km² and covering 44 000 km² amounts to US$ 150 /km². The main components expressed as a percentage are:

Item	Percentage
Salaries	58,8
Field staff	52,1
Administrative staff	6,7
Transport	19,2
Vehicles, aircraft, etc.	
Maintenance	13,6
Roads, watering points, etc.	
Other	8,4
Uniforms, office equipment	

The projected costs of conserving viable rhino populations, as calculated by nature conservationists are as follows:

Species	Number	Density (km²/unit)	Area required km²	Cost /km² US$	Cost p.a. US$
Black rhino	2 500	3	7 500	400	3 000 000
White rhino	2 500	1,5	3 750	400	1 500 000

TABLE 6: WHITE RHINOS UTILIZED THROUGH HUNTING

Year	Population est.	Hunted	Percentage
1968-87	-	25	0,93
1987	4126	42	1,02
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1990	5198	40	0,77
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1993	6376	39	0,61
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Source: K Adcock (In: Penzhorn & Kriek (eds): *Rhinos as Game Ranch Animals*)

Income derived from white rhinos

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Auction prices (solid line) increased sharply during 1987-1989, which is attributed to the Natal Parks Board introducing auctions in 1989. The percentage of animals hunted (dotted line) decreased, as hunters were no longer able to purchase animals from the Natal Parks Board at a fixed price. Supply and demand stabilized during 1990-1991.

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Year	Population	Number sold	% of Population	Av. Price
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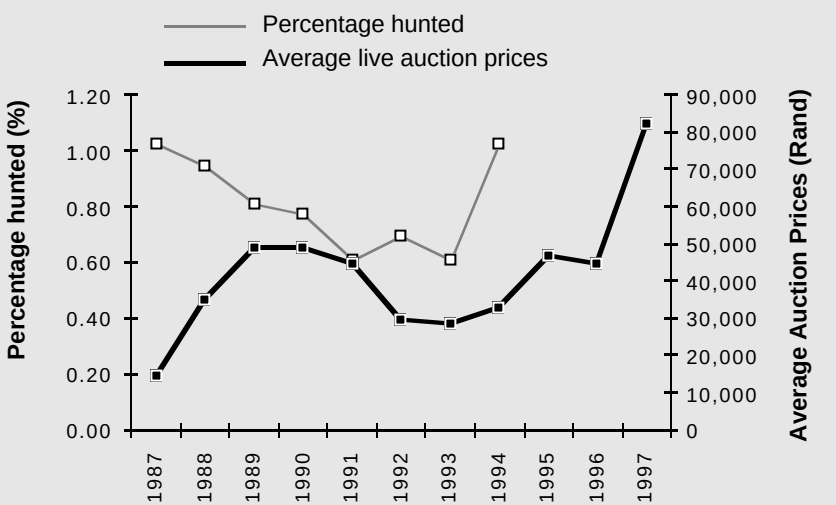
1989	4813	41	0,85	48 732
1990	5198	42	0,81	48 524
1991	5613	32	0,57	44 188
1992	6062	64	1,06	29 230
1993	6376	56	0,88	28 348
1994	6770	30	0,44	32 767
1995	7334	70	0,95	46 629
1996	7920	161	2,00	44 575
1997	-	39*	-	82 051

Source: K Adcock (In: Penzhorn & Kriek (eds): *Rhinos as Game Ranch Animals*)

* Natal Parks Board auction only

Figure 6: Auction Prices vs. Utilization by Hunting



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This information confirms that rhinos are a good investment for game ranchers. The true value of the animals emerged when normal market forces came into play after the Natal Parks Board had put a stop to the dumping of cheap animals on the market. Currently, between 20% and 25% of the white rhino population is in private ownership. If we consider expenses stated previously in this chapter, it is clear that the private sector has contributed US$ 1 500 000 toward the conservation of this species.

Ranching for horn production

Arguments in favour of the trade

- Rhino ranching is ten times more profitable than cattle ranching on the same area of land.
- The CITES ban is not effective. Populations which are poorly managed remain small.
- The sale of rhino horn will earn foreign exchange for the country.
- Dehorning does not affect the social behaviour of the rhinos.
- It is a morally acceptable process, as the animal is not killed in the process of harvesting the horn.
- It is unlikely that dehorned breeding bulls will be able to kill subadult animals.
- Dehorned rhinos detain poachers in an area in their quest for animals, thereby increasing the chances of the poachers' capture.

Arguments against the trade

- Dehorned animals will still be poached. As only two-thirds of the horn is removed, the horn base will still be attractive to poachers. This is a spurious argument; if trade in only the top two-thirds of the horn is legalized, trading horn bases will be illegal and they will be easily

identified. The photograph on page 6 illustrates how the horn being harvested is cut just above the hair line. According to Oriental traditions, the horn tip is the most valuable; Indian rhino horn is better than that of black rhinos, which in turn is better than that of white rhinos.

- Dehorning will stimulate the market. It should be emphasised that horn will be harvested for commercial reasons and not to stop poaching. As was illustrated in the discussion on how hunting influenced the price of rhinos, market forces will push up the price of live rhinos even further. Private owners will protect their investments by employing trained staff, thereby curtailing illegal hunting.
- Demand exceeds supply. This trend will continue until the last rhino is killed. When the Chinese realise that rhino horn is a sustainable product, they will start rhino ranching and will try purchasing as many live rhinos as possible.
- Dehorned white rhinos cannot defend themselves against carnivores. Carnivores become skilled in killing specific prey, and will even kill rhinos which have horns.

In summary

It might be asked: Why don't all the rhino ranchers form a company to market rhino horn? Why can't this company be listed on the Tokyo Stock Exchange? Are these not elements of a democratic capitalist system?

A dehorning operation in Zimbabwe involving 71 rhinos cost US$ 400 per animal. A similar operation in the Namib Desert cost US$ 2450 per animal. Both operations took place in open ecological systems and the cost of flying was the most important expenditure (See Table 8). These expenses will be substantially lower on game ranches.

Price of rhino horn

The media state that the street value of rhino horn is between US$ 2 000 and US$ 10 000 per kg. The actual price is unknown, as true market forces have not been tested at a public auction of rhino horn. A survey in South Korea revealed the retail price of rhino horn (see Figure 7). If the wholesale price is 60% of the retail price, Table 9 gives an indication of what a rhino rancher can earn at an auction. The percentage could be even higher, if Oriental pharmacists purchase directly from the supplier and eliminate middlemen.

TABLE 8: EXPENDITURE: ZIMBABWEAN DEHORNING OPERATION

Item	Cost (US$)	Percentage
Helicopter	23 800	79,0
Fixed-wing aircraft	2 800	9,3
Immobilisation	2 000	6,6
Vehicles	500	1,7
Medical supplies	500	1,7
Other	500	1,7
Total	**30 100**	**100**

Source: M D Kock

TABLE 9: PRICES OF RHINO HORN IN SOUTH KOREA (US$/KG)

Year	Retail Price	Estimated Wholesale Price
1980	1 436	862
1982	1 797	1 078
1986	1 771	1 063
1988	4 288	2 573
1992	6 768	4 061
1993	13 383	8 030

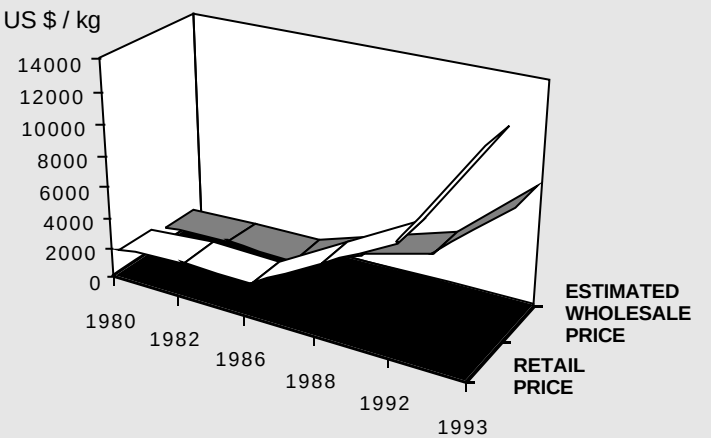
Source: J A Mills

Proposed marketing method

Safety aspects can easily be applied through modern technology, by holding an auction on the Internet. Rhino horn stored safely in a certified strong-room can be purchased directly by an Oriental pharmacist. The various lots on sale can be offered beforehand by means of a photograph, microchip number, measurements and mass.

Each horn can be accompanied by a certificate of authenticity, stating the animal of origin, the date of dehorning as well the name of the owner.

Figure 7: Price of rhino horn in South Korea



If horn bases are available, fresh horns can easily be distinguished from old ones. Horns without bases are legal only if they have a certified microchip number. The burden of proof regarding an illegal horn is thus easy to establish.

Horns may only be marketed on a quota system. Rhino ranchers should be members of a company, and their rhinos should be registered with that company. Horn can be harvested every third year. If a rancher has 12 registered rhinos, four horns can be marketed per annum.

The road ahead

Rhino ranchers should:

- Organise themselves and join an organisation which looks after their interests.
- Establish a marketing company.
- Finance research into the production of rhino horn.
- Analyse the market and marketing strategies.
- Propagate the idea of rhino horn ranching in the media.
- Start selecting suitable genetic material (See Appendix II).

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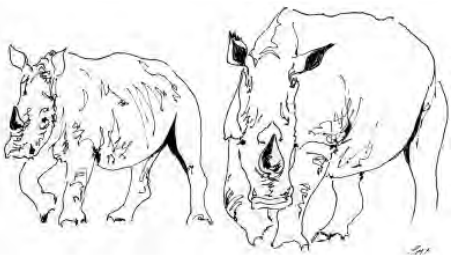
10 Finances



The costs of conservation

A cost analysis of an anti-poaching unit in Zimbabwe at 1 man /50 km² and covering 44 000 km² amounts to US$ 150 /km². The main components expressed as a percentage are:

Item	Percentage
Salaries	58,8
Field staff	52,1
Administrative staff	6,7
Transport	19,2
Vehicles, aircraft, etc.	
Maintenance	13,6
Roads, watering points, etc.	
Other	8,4
Uniforms, office equipment	

The projected costs of conserving viable rhino populations, as calculated by nature conservationists are as follows:

Species	Number	Density (km²/unit)	Area required km²	Cost /km² US$	Cost p.a. US$
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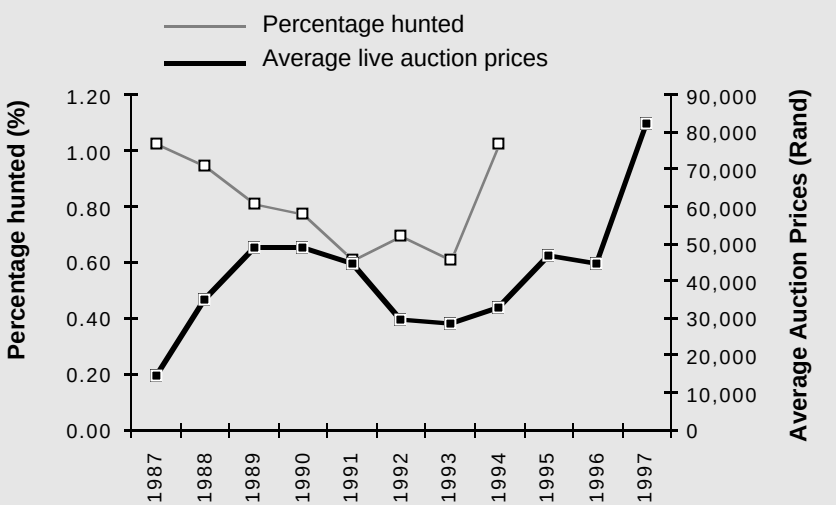

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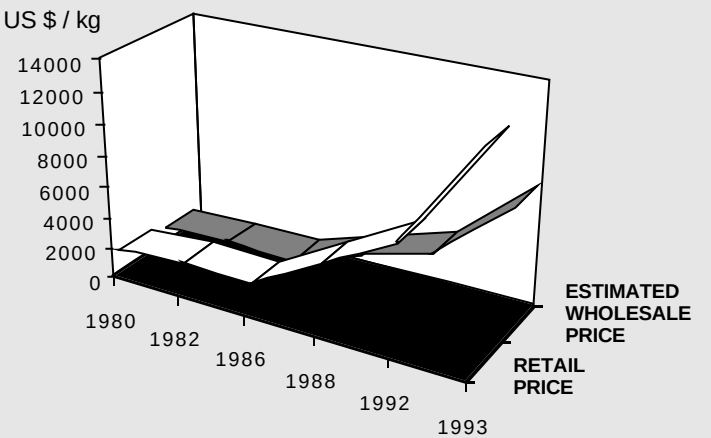

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Further reading

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Appendix I – Organizations

Natal Parks Board
It is largely due to the work of the Natal Parks Board that the 'southern' white rhino is not extinct today. The Board was established in 1947 in terms of the Natal Parks Game and Fish Preservation Ordinance (No. 35 of 1947) as a semi-autonomous body funded by the Kwazulu-Natal Province. The Hluhluwe and Umfolozi Parks were proclaimed on 27th April 1897 as conservation areas, making them the oldest existing game parks in Africa. At the time, these two parks were the last home of a few hundred white rhino — the last stronghold of these animals in Southern Africa. Since then, the Natal Parks Board has been instrumental in increasing the population to more than 6 000 world wide. The Natal Parks Board supports the international regulation of trade by CITES and the harvesting of rhino horn. Natal Parks Board, PO Box 662, Pietermaritzburg 3200, South Africa. Tel: 0331 47 1961. Fax: 0331 47 1037.

Rhino and Elephant Foundation (REF)
This fund-raising organization was founded by Clive Walker, Anthony Hall-Martin and Peter Hitchins to generate funds for elephant and rhino research and conservation projects. The president is Dr M Buthelezi (REF, P O Box 381, Bedfordview, 2008).

World Wide Fund for Nature (SA)
The South African branch of the WWF was founded in 1968 and was previously known as the Southern Africa Nature Foundation. The WWF, the largest international conservation organization, has the following objectives:

- The identification of high-priority conservation projects
- The administration of fund-raising and disbursement of funds
- The purchase of land for conservation
- Education and training

Since its inception, WWF(SA) has raised more that R100 million for over 400 projects [WWF(SA), PO Box 456, Stellenbosch, 7599].

Endangered Wildlife Trust
The trust was established in 1973 as a private, non-profitable organization which operates in Southern Africa and concentrates on research, conservation and creating an awareness among the public of the problems in conservation. The trust raises funds for the conservation of endangered species (EWT, Private Bag X11, Parkview, 2122).

Wildlife Society of South Africa
The society is a non-profitable, private organisation with 30 000 members. Its goals are conservation education of children and being the watchdog to prevent environmental disasters. The society is managed in various branches by volunteers on a regional basis (Wildlife Society SA, P O Box 44189, Linden, 2104).

Trade Records Analysis of Flora and Fauna in Commerce (TRAFFIC)
This organization is funded by WWF-SA and the EWT. Its main function is gathering

data on the illegal trade in endangered animals and plants and their products. The organization cooperates closely with law-enforcement agencies and has built up a network in South Africa, Malawi and Tanzania. (TRAFFIC, Private Bag X11, Parkview, 2122).

Convention on the International Trade in Endangered Species (CITES)
This convention, which has been signed by more than 100 countries world-wide, aims at controlling the trade in endangered animals and plants. The species are classified as Appendix I (Threatened), Appendix II (Vulnerable) and Appendix III (Possibly Endangered). The black rhino is on Appendix I and the white rhino on Appendix II. The control of trade is based on a permit system. The COP (Convention of Parties) is held every four years to evaluate the status of threatened populations. To legalise trade in rhino horn, all member countries have to vote at a COP.

Professional Hunters Association of South Africa (PHASA)
The Professional Hunters Association of South Africa has more than 700 members, who hunt mainly in Africa. PHASA liaises with other organizations in the hunting business and ensures that its members hunt ethically (PHASA, P O Box 10264, Centurion, 0046).

Endangered Species Protection Unit (EPSU)
This specialist unit of the South African Police Service was founded in 1989. Its task is to identify smuggling routes and to expose smuggling networks. The Lusaka Agreement, which was signed in 1992, authorises the ESPU to investigate cross-border operations (ESPU, Private Bag X302, Pretoria, 0001 - tel 012-8039900).

African Rhino Owners Association (AROA)
This association, founded at Onderstepoort in 1994, aims at uniting rhino ranchers who are interested in utilisation of their animals. Advice is given to ranchers and AROA surveys rhino populations on private land (AROA, P O Box 381, Bedfordview, 2008; tel 011-459829; fax 011-4537649).

Rhino and Elephant Security Group of Southern Africa
This is a grouping of serving professionals in the field of wildlife management and the police force to undertake investigations and formulate anti-poaching strategies. They have government representation and meet twice a year to monitor and adapt programmes (Mr Ian Thomson (Co-ordinator), Rhino and Elephant Security Group of Southern Africa, P O Box 50155, Veldenvlei, 3900; tel/fax: 0351-786-0639).

African Rhino Specialist Group
This is a specialist group of the IUCN consisting of biologists. Their aim is to look at the welfare of rhino populations from a genetic and habitat point of view. The Rhino Management Group, a subgroup of the African Rhino Specialist Group, is involved with the management of various rhino populations (Dr P M Brooks (Chairman), African Rhino Specialist Group, Natal Parks Board, P O Box 662, Pietermaritzburg, 3200; tel: 0331-471961 / 0331-473278).

Wildlife Group of the South African Veterinary Association
The Wildlife Group, a special interest group of the South African Veterinary Association, aims to promote and co-ordinate veterinary research and all aspects related to nature conservation and wildlife management in Southern Africa. It provides a forum for the interchange of ideas amongst its members and members of other associations concerned with nature conservation and wildlife, by holding regular meetings, congresses, symposia and courses. The Friends of the Wildlife Group are non-veterinarians supporting the aims of the Group (Secretary, SAVA Wildlife Group, P O Box 12900, Onderstepoort, 0110; tel: 012-529-8253; fax: 012-529-8312).

Rhinoceros Museum
The museum is based in the Waterberg at the old Melkrivier private school. It was initiated by the Rhino and Elephant Foundation and the main purpose is education for school children (Mr C Walker, P O Box 381, Bedfordview, 2008; tel: 011-453-9828; fax: 011-453-7649).

Appendix II – Resources

ATTORNEYS

Rooth & Wessels
Mr S de Beer
P O Box 35494
0102 MENLO PARK
Tel 012-3484902 Fax 3484908

AGENTS / BROKERS (WILDLIFE)

Game Marketing Association
Mr F Ras
P O Box 260
3290 HOWICK
Tel 0332-307470 Fax 0332-307118 Cell 082 8866 437

Stock Owners Co-op (Game)
P O Box 260
3290 HOWICK
Tel 0332-307470 Fax 0332-307118 A/H 0331-940705

AGENTS (FARMS)

Wildnet Africa
Mr C McKenzie
P O Box 73528
0040 LYNNWOOD RIDGE
Tel 012-9913083 Fax 9913851

STUD BREEDERS (HORNS)

Kwanare
Mr Sas du Toit
P O Box 828
2057 MORNINGSIDE
Tel 083 4567000
Fax 011 883 8546

Mr L Johnson
P O Box 123841
1451 ALRODE
Tel 011-6162467

Mr T Ludin
Thaba Tholo
P O Box 1109
2123 PINEGOWRIE
Tel 011-886 8296 Fax 886 8083

Mr C Mostert
P O Box 530
1380 HOEDSPRUIT
Tel/Fax 015-7932495

CONFERENCE FACILITIES

Dr H Kohrs (Clinical, Consulting)
Pongolapoort Bio-reserve
P O Box 792
3170 PONGOLA
Tel 034- 4132492 Fax 43 51061
Cell 083 255 0742

CONSULTANTS

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0132 SUNNYSIDE
Tel/Fax 012-5672290

Dr H Ebedes
Agricultural Research Council
Private Bag X5
0110 ONDERSTEPOORT
Tel 012-5299203 Fax 5299434

Mr D Pienaar
Private Bag X402
1350 Skukuza
Tel 013 7355611 Fax 7355467

Prof W v Hoven
Centre for Wildlife Management
University of Pretoria
0002 PRETORIA
Tel 012-4202569 Fax 3622021
Cell 082 557 3142

DART GUNS & EQUIPMENT

Dan-Inject International SA
Mr F Rohr
Private Bag X402
1350 SKUKUZA
Tel 013-7355611 Fax 7355467
A/hrs: 013-7355449

EXPORTER / BROKERS

Bester Birds & Animals
P O Box 72378
0040 LYNNWOOD RIDGE
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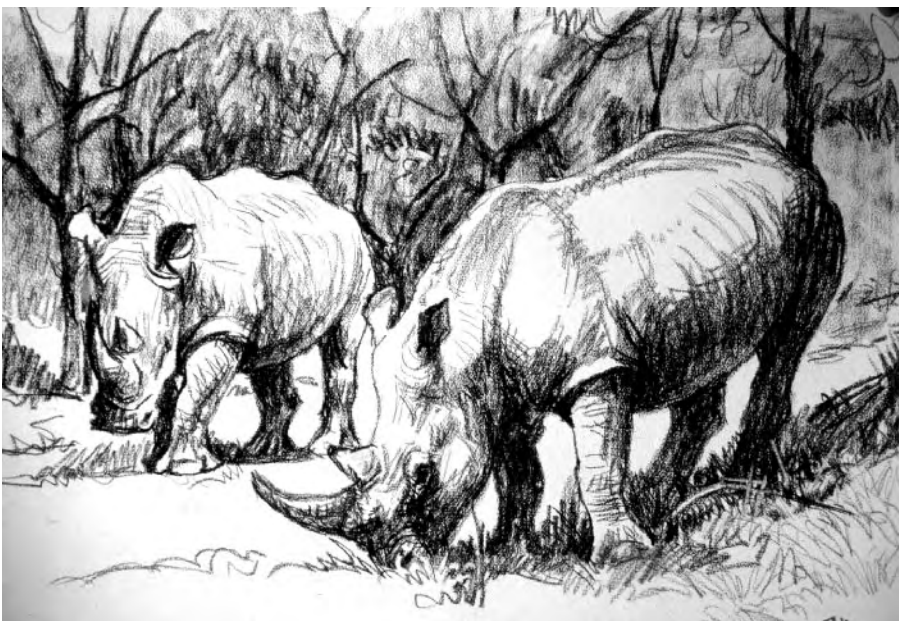
'If there's anything more to know about a rhino, it can only be of interest to another rhino.' — RC Dryer.

Acknowledgements



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