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THE BLACK RHINOCEROS CONSERVATION PROGRAMME AT WESTERN PLAINS ZOO IN AUSTRALIA

The black rhinoceros is critically threatened with extinction. In 1970 numbers were estimated at 65 000. In 1996, only 2 408 survivors were identified.

Efforts to save the black rhinoceros from extinction were intensified in 1991 with the formation of what is now known as the International Rhinoceros Foundation (IRF). The Zoological Parks Board of New South Wales in Dubbo was a founding member of the IRF and continued involvement with the Foundation embodies its total commitment to the conservation of black rhinoceros. One of the objectives of the IRF, is to provide support for the development of captive breeding programmes in the United States of America and Australia. The captive breeding programme at Western Plains Zoo (WPZ) was designed to ensure the survival of the black rhinoceros in the wild by augmenting the gene pool outside Africa.

Black rhinoceros at Western Plains Zoo

In February 1993 the captive breeding programme of black rhinoceros at WPZ commenced with the importation of two males and seven female black rhinoceros from Zimbabwe. Once captured the animals were transported to Boulton quarantine centre near Harare, where their health was monitored and they were tested for diseases as part of the Australian quarantine importation protocol. The nine animals, judged suitable for transport to Australia, were crated and flown to Australia's high security quarantine station on the Cocos Islands on 30th November 1992. These rhinoceros spent 60 days in quarantine where they were further tested for diseases and treated for both ectoparasites and endoparasites. Unfortunately, the adult male died on day 41 of quarantine, after developing a severe hepatopathy. At the end of the 60 day quarantine period the remaining male, a young animal, and seven females were transported to WPZ.

Upon arrival at WPZ they were housed in enclosures situated in the new 1.6 million dollar black rhinoceros breeding complex. The complex, which was completed in August 1992, is 7.2 hectares in area and comprises 35 enclosures including two public viewing exhibits.

Sadly, the remaining male died as a result of trauma sustained shortly after arrival at the zoo and two months later a female died after developing the same hepatopathy syndrome which killed the adult male on Cocos Islands. The remaining six females adapted well to captivity and settled quickly into husbandry routines.

In November 1994 four male black rhinoceros were imported from the U.S.A. These animals came from San Diego Wild Animal Park, San Diego Zoo, Milwaukee Zoo and Fossil Rim Wildlife Centre.

Breeding

The breeding management of black rhinoceros has involved both natural and assisted breeding.

Picture by Andrew Thorne

View of the breeding complex.
Row of night yards with sheds down centre.
Larger grassed day yards on right and left of night yards.
Veterinary/calving yards in foreground (with black rubber walls).

Natural breeding

The immediate priority has been to allow natural breeding to take place due to a number of advantages over assisted breeding. These advantages include the obvious fact that natural breeding is readily achievable compared to what is still required in terms of assisted breeding techniques and it is non-evasive and less intensive in terms of animal management.

At WPZ males and females are situated in adjoining yards where they have visual, olfactory, audio and limited tactile contact. This gives a general indication of compatibility and allows the male to detect oestrus in the female. When the female is deemed to be 'in season', as indicated by her behaviour as well as that of the male, a gate is opened between the adjoining yards giving both animals access to each other and both yards.

Once introduced, the animals are left together for two days or more to cover the full oestrus period of the female. An increase in aggression and intolerance of each other occurs a few days after mating at which time the animals are separated and left in adjoining yards until the female is next due in oestrus, providing she has not fallen pregnant.

Since the arrival of the males in 1994 there were a number of matings, but only the female, Kalungwizi, was confirmed pregnant three months after being mated in March 1995. Kalungwizi gave birth to Kusomona, a male calf, on 25 May 1996 after a pregnancy of 446 days. In September 1997, Kusomona had reached the age of 16 months and weighed in at 600 kg. He will be weaned in the next few months and his mother returned with the breeding male for mating.

Personnel at the WPZ are currently looking into possible reasons for the low rate of conception, including checking the animals for venereal diseases which can cause short term infertility (these tests were all clear), following oestrous cycles of the females to ensure they are ovulating and also looking at collecting and testing a semen sample from a bull.

Assisted breeding

To complement natural breeding, a programme of assisted breeding has been implemented with the aim of developing techniques to enhance reproductive output as well as collection and storage of gametes. The establishment of artificial breeding facilities at both Taronga and WPZ, as well as an animal gene storage centre at the Institute of Reproduction and Development (IRD) at Monash University in Melbourne, are integral components of the black rhinoceros assisted reproduction programme.

Some of the reproductive biotechnology currently being utilised and researched on the black rhinoceros include:

- Oestrous Cycle Characterisation
- Early Pregnancy Detection
- Semen Collection
- Artificial Insemination
- In-vitro Fertilisation
- Embryo Transfer
- Genome Banking

The benefits of these techniques to the black rhinoceros are obvious considering there are

only 208 animals in zoological parks around the world and also bearing in mind that black rhinoceros are large, require very strong enclosures, consume large quantities of food and are often prone to stress.

Oestrous/pregnancy monitoring

Female black rhinoceros, unlike many other species of mammal, tend to exhibit very few reliable overt signs of oestrus, making the task of mapping or characterising their oestrous cycles more difficult. WPZ employs a number of strategies to overcome this problem.

Behavioural observations are carried out to follow any patterns in behavioural or physiological changes. Parameters such as restlessness, aggressive behaviour, vaginal mucous secretion, urine dripping and changes in appetite are used in this respect. These patterns vary between individual animals and the females do not exhibit any of the factors mentioned.

The interaction between males and females allows oestrus detection in females. The male shows increased attention towards the female, frequently spraying urine towards the female's yard. The female often displays positive solicitation behaviour towards the male and may present her hindquarters to the male at the dividing fence and stand for the male to mount her. She also urinates frequently along this fence line.

Trans-rectal ultrasound of the reproductive tract of females allows imaging of ovarian activity to enable accurate prediction of ovulation and oestrus and also enables pregnancy detection as early as one month after fertilisation.

Hormone analysis of blood, urine, saliva and faeces is extremely useful in determining oestrous cyclicity and pregnancy. Collection and analysis of blood plasma represents the ideal scenario for this type of testing as the assays are fairly straightforward and reliable.

The collection of saliva involves less stress to the animal and collector and a project is underway at WPZ to investigate the usefulness of salivary hormones in assessing oestrous cycle activity and pregnancy.

The collection of urine is non-evasive and involves minimum stress to the animal but has the disadvantage of being less reliable due to irregular patterns of urination. The other negative aspect of testing urine is that the assays are more complex due to hormones being present in less available forms.

The collection of faeces is possibly the easiest method for manual data collection and the most reliable for non-tractable animals. Although tests are fairly complex, the resources which have been devoted to this area have meant that these tests are becoming more available.

To facilitate on-site testing of blood, urine, saliva and faecal samples from black rhinoceros and other species at WPZ, an Amerlite analyser system was provided by the Johnson & Johnson Clinical Diagnostics company in June 1996. This system uses immunoassay technology and will allow the accurate measurement of hormone levels in various samples.

Semen Collection

Methods of semen collection being explored include manual manipulation of the penis, use of an artificial vagina and electro ejaculation. Conditioning of the two sub-adult males for these procedures is in its preliminary stages. It is hoped to have the animals trained to the point where they will submit to semen collection methods when they reach sexual maturity in two to three years time.

The decline of rhinos has been described as the single most dramatically disheartening extinction event of our time. The black rhinoceros conservation programme at WPZ is part of an international effort aimed at ensuring this does not happen. The use and development of artificial breeding biotechnologies may one day lead to test-tube rhinoceros calves and surrogate mothers. While these accomplishments may be realities in the future, the equally important business of natural breeding will be the immediate priority in order to produce many more black rhinoceros to add to the already growing group of 12 at WPZ.

'Kalungwizi' and 'Kusomona' 2nd May 1996 - Calf 3 days old. *Picture by Andrew Thorne*

25 May 1996 - 'Kusamona' - A few hours old. *Picture by Andrew Thorne*