

Management and Breeding of Southern White Rhinoceros (*Ceratotherium simum simum*) at the Jacksonville Zoo

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Introduction

In 1967 the Jacksonville Zoo purchased a pair of wild-caught Southern white rhinoceros (*Ceratotherium simum simum*), 1.0 "Dublo" and 0.1 "Omgawa". There animals were housed in our rhino exhibit and up to 1975 had not produced any offspring. At that time an additional male, "Archie" and two females, "Edith" and "Wrinkles", all wild-caught, were added to the collection. By 1977, with still no breeding success, it was decided that to better simulate conditions in the wild, the herd would be introduced to one of our new exhibits, The African Veldt. The decision called for the herd to be let out onto the Veldt, approximately nine acres in size, in the morning then "rounded up" in the afternoon and returned to their exhibit. This paper will detail our procedures of management, our ten births, and possible improvements to increase reproduction and decrease infant mortality.

Housing facilities at the Jacksonville Zoo

The rhino house at the Jacksonville Zoo is divided into two sections approximately 46.45 square meters (500 sq. ft.) each in size. They are separated by a keeper access/food storage area (see Fig. 1) running from the front to the back of the house measuring 11.9 meters (128 sq. ft.). Steel shift doors with 25mm (one inch) thick steel pipes that slide into holes in the concrete walls enable the keeper to block off access to this area to the rhinos while moving them from one side of the house to the other. The floor and walls of the house are concrete. The walls are 1.37 meters (4.5 ft.) high and .45 meters (1.5 ft.) thick. On top of the walls there is 83.82 cm (2 ft. 9 in.) of 19mm (3/4 inch) thick metal bars about 10cm (4 in.) apart. Two 1.2 meter (4 ft.) radiant heaters mounted on the new roof provide sufficient heat. Sliding steel doors are used to lock the rhinos in or out of the two house sections.

Each section of the house has an adjacent yard of about 743 square meters (8,000 sq. ft.) with a substrate of limerock, dirt and sand. The rear wall of the rhino house extends out to surround and divide the yards. A raised sidewalk at the front of the exhibit allows the public to view the rhinos in the yards. While most of the rhinos are released into the Veldt each morning, we always leave at least one in the yards; usually this is a pregnant rhino or a mother and calf. Cement enclosed bathtubs are used to hold the rhinos' water. These bathtubs overflow and are drained into a cement ditch that runs the entire length of the front of both yards. This ditch is 0.6 meter (2 ft.) below the level of the yards and allows excess water to drain from the yards, but it is not a moat. The rhinos can and do step in and out of it at will. To allow entrance to the yards with a truck there are steel double doors that open inward. It is through these doors in the north yard that the rhinos gain access to a corridor that leads to the African Veldt Exhibit.

Jacksonville Zoo's African Veldt

The African Veldt came into existence in 1971. For the first ten years it went through many changes. Found on the north end of this nine-acre exhibit is an island 53.3 meters (175 ft.) wide and 114 meters (375 ft.) long, with a moat about 6 meters (20 ft.) across. The depths of this moat range from 0.3 meters to 1.8 meters (1-6 ft.) At the southeast corner of the island is a limerock access road.

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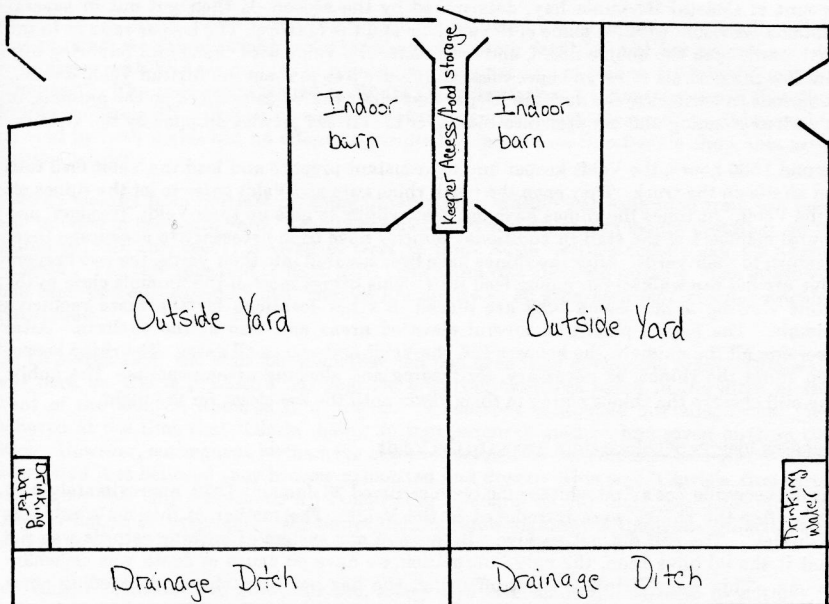


Figure 1

Throughout the Veldt are various types of deciduous and evergreen trees. These trees are wrapped with chain link fencing to prevent destruction by the animals. Located on the south end of the Veldt are two open-sided shelters for the use of the Veldt inhabitants. These shelters have a concrete substrate that was raked after pouring to provide traction when wet.

Over the years several means of public viewing were tried for this new type of exhibit. In 1981 the zoo constructed an elevated walkway that stretched out onto the Veldt. The walkway is 1.8 meters (6 ft.) wide and 2.13 meters (7 ft.) above ground level, with a 0.91 meter (3 ft.) guardrail from the floor of the walkway to the handrail. The walkway is protected by a hotwire to prevent large animals from going under it or causing damage. This walkway has signs along it describing the animals on exhibit, and leads to a pavilion with shaded areas, benches, and a concession area. There are two sets of high-powered binoculars available for the visitors to view animals that might be hiding at the outer edge.

During the eighteen years this exhibit has been available for visitor viewing, many different species of birds and hoofstock have been tried in the enclosure. At present, the permanent inhabitants include 2.6 Eland (*Taurotragus oryx*), 6.5 Sitatunga (*Tragelaphus spekei*), 0.2 Brindled gnu (*Connochaetes taurinus*), 2.0 Greater kudu (*Tragelaphus strepsiceros*), 1.3 Thomson's gazelle (*Gazella thomsoni*), 1.2 Masai ostrich (*Struthio camelus massaicus*), and 7.0 Egyptian geese (*Alopochen aegyptiacus*).

Management of rhinos

Every morning the keeper isolates the rhinos that will have access to the Veldt that day in the north rhino yard. He then goes out to the Veldt and removes the 28 rubber feed tubs that were dropped the night before for the animals that are permanently kept in the exhibit. An

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amount of Coastal Bermuda hay, determined by the season, is then put out in several locations. A visual check is made of the animals and the hotwire. The keeper returns to the north yard, open the double doors, and backs onto the Veldt with the rhinos following him out. For the next six to seven hours these rhinos are free to roam the African Veldt Exhibit. At various times during the day, the keeper may enter the Veldt to check on the animals, to do various cleaning and maintenance chores, or to retrieve articles dropped by the visitors.

Around 1600 hours, the Veldt keeper and an assistant prepare and load the Veldt feed tubs and alfalfa on the truck. They open the north rhino gate and Veldt gates to let the rhinos off of the Veldt. At times the rhinos have not been willing to give up their Veldt "freedom" and several members of the staff in additional vehicles have been necessary to encourage them to return to their yards. After the rhinos have been secured into their yards, the two keepers drive around the walkway dropping feed tubs. This brings most of the animals close to the public viewing area. Some tubs are placed in other locations for the more reclusive animals. The hay is placed at several elevated areas and also at the shelters. After observing all the animals, the keepers exit the Veldt and secure all gates. The rhino keeper then shifts the rhinos, as necessary, for feeding and sleeping arrangements. The public may still observe the rhinos eating in their yards until the zoo closes for the night.

Breeding history of rhinos since access to the Veldt

The Jacksonville Zoo's first white rhino birth occurred 26 January 1979, approximately two years after the rhinos were introduced to the Veldt. The mother of this male calf was "Wrinkles". The calf did not survive. Because of our system of keeping records was not what it should have been, the only information we have on cause of death was cagemate trauma. This was "Wrinkles" first offspring; she has not been observed breeding since that time.

At the same time, "Edith" was believed to be pregnant and was isolated from all other rhinos in the south yard. On 5 March 1979, "Edith" gave birth to a female calf which survived and was named "Gloria". The sire of these first two calves is unknown because both males were observed breeding the dams. On 29 June 1979, our original male, "Dublo" was shipped to Kansas City Zoo on breeding loan. "Edith" proved to be an excellent mother and "Gloria" thrived and grew. When "Gloria" was about a year old she was allowed access to the Veldt with the rest of the herd. No actual breeding was observed of "Edith" at this time but from our records it is evident that it did indeed happen. This breeding resulted in the birth of a female calf on 2 November 1981. For weeks prior to this birth "Edith" and her daughter "Gloria" were isolated in the south yard after changes in her udder were observed. We did not feel that the two-year-old daughter would present a threat to a newborn calf. Upon discovery of the calf on that morning, "Gloria" was removed because "Edith" seem agitated with her presence in the yard. Unknown to the staff, because no external lesions were visible, cagemate trauma had already occurred. The following day the calf seemed somewhat depressed and on the second day was found dead. A necropsy was performed and cause of death listed as a fractured liver. "Edith" was returned to the herd and allowed access to the Veldt.

Due to renovations being done at Kansas City Zoo, on 5 January 1983, our original male "Dublo" was returned to our facilities. Along with "Dublo" came Kansas City Zoo's female, "Anne", on breeding loan. This brought our rhino population up to 2.5. No breeding was being observed since the death of "Edith's" last calf. On 16 July 1983, about twenty months after being reintroduced to the herd, "Edith" delivered a male calf. The calf was found dead. A necropsy revealed that it has been alive at birth but suffered a fractured spleen which resulted in profuse abdominal hemorrhage. The calf seemed a bit underdeveloped and no changes had been apparent in "Edith's" udder prior to the birth. As we had no breeding observations to refer to, this female had not been isolated from the herd and two other adults were present during the birth. "Edith" was given access to the Veldt on the same day of the birth, and in the next few days several breedings were observed.

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At this point, given "Edith's" fertility record, we assumed her to be pregnant again. With this in mind, we reevaluated the working capacity of our facilities and our procedures. In conjunction with SSP we decided to relocate our original pair of rhinos, 1.0 "Dublo" and 0.1 "Omgawa". The pair was shipped to White Oak Plantation, a privately owned breeding facility, in Yulee, FL. It should be noted that through the years "Omgawa" was observed to be bred by both males but no offspring resulted. Updates on this female show this same pattern to exist.

Sixteen months from her last breeding observations "Edith" was separated from the herd and isolated in the south yard. Exactly one day short of the eighteen month gestation, on 15 January 1985, the keeper arrived at work to find "Edith" with a female calf we named "Angela". The calf appeared to be in good health and was observed nursing. The afterbirth had been passed. Again "Edith" showed her ability to be a devoted mother and "Angela" flourished.

On 18 March 1985, the staff found another calf had been born during the night. This male was born to "Gloria", "Edith's" six-year-old offspring, and was found in the ditch at the front of the exhibit, apparently drowned. A necropsy confirmed our suspicions. We believed at the time that "Gloria" being an inexperienced mother, had given birth in the ditch. However, subsequent births have shown newborns to stumble into this ditch. If left unassisted it is believed they become exhausted and drown. This was "Gloria's" first birth and as we had only seen some brief mounting attempts by our male, we really had not thought her to be pregnant. Her udder did not show significant changes. "Gloria" was allowed to stay with the herd and immediately our male bred her.

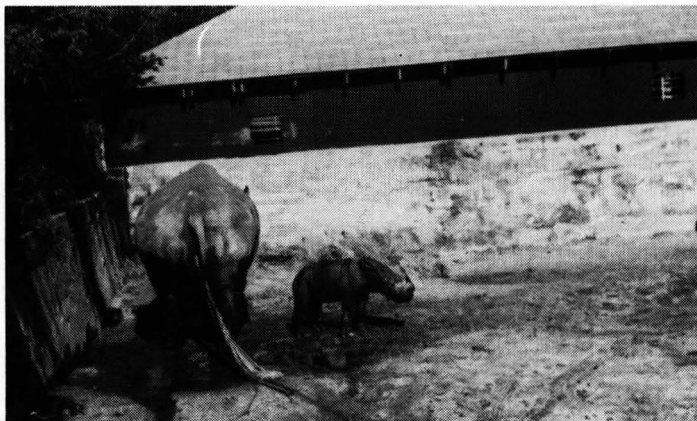
As "Angela" continued to grow, our zoo, along with SSP made the decision to sell her to Ruhr Park Zoo in West Germany. At six and one half months of age "Angela" was separated from her mother. Although she had been eating grain and hay as well as nursing, after the separation she showed little or no interest in food. After three weeks, "Angela" had lost weight and she was showing no signs of improvement. We placed her older sister "Gloria" with her, and she immediately began eating. After two weeks, she had regained her former weight, and when we returned "Gloria" to the herd, "Angela" continued to eat on her own. On the evening of 9 October 1985, "Angela" was crated, loaded on a flatbed truck, and driven to Miami International Airport. Since "Angela's" shipment we have had limited correspondence with Ruhr Park Zoo, but to our knowledge she is doing well. In the time "Angela" was with us she was not allowed access to the Veldt.

With "Angela" gone we turned our thoughts back to "Gloria". We calculated dates and at sixteen months after breeding, we isolated her from the herd. At this time we noticed some changes occurring in her udder. Two days short of seventeen months after breeding, she delivered a female calf. This female was named "Betty Boop" and appeared to be fine except for an abrasion behind her left eye. Our veterinarian, Dr. Doug Page, was concerned by this abrasion and felt it necessary to treat the wound. The mother was separated from the calf. While the calf was restrained, an ulcer in the left eye was noted and treated. Having "hands on" the animal, we weighed her at 62.7 kg (138 lbs.).

A week went by and "Betty Boop" seemed to be progressing well. We separated her from the dam once more to check on her condition. Her eye was about seventy percent healed and her weight had climbed to 70.9 kg (156 lbs.). Three days later she was found dead. A necropsy was performed and the cause of death was a Salmonella septicemia. We determined that this was contracted from the mud wallows in the yard. The mud wallows were filled in with limerock in our "maternity" yard and have since been kept as such. "Gloria" was once more allowed access to the herd on the Veldt. No breeding was observed for two months after her reintroduction.

We went back to our breeding records and set our sights on "Edith" to give birth at the end of March or beginning of April 1987. We planned to isolate her from the herd on 30 January 1987. On the morning of 23 January 1987, the keeper arrived and found "Edith's" udder had undergone profound changes during the night. She was separated and retained in the south

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Birth of 1.0 Southern White Rhinoceros "Giant" on 23 January 1987 at the Jacksonville Zoo, Jacksonville, FL. (Photo: William Thacker, Education Supervisor)

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yard while the herds was accessed to the Veldt. Around 0900 hours "Edith" appeared to be in labor. By 1025 hours, a male calf, "Giant" was born in the corner of the exhibit. By 1100 hours he was observed standing and nursing by 1430 hours. It should be noted that the gestation of this male calf was slightly under sixteen months. The following day he was separated from the dam and found to be in good health, fully developed and weighed 72.7 kg (160 lbs.). In less than one and one half months the calf was observed eating bran and oats. In the next month we began introducing him to our other rhinos. These introductions were without problems. At three months "Giant" was allowed access to the Veldt with the rest of the herd. The calf was observed to nurse up to one and a half years of age.

Once again we went back to our breeding records and calculated "Gloria" to be due at the end of April 1988. On 1 March 1988, she was separated from the herd, changes in her udder were visible to the keeper. On 21 March 1988, the staff arrived to find "Gloria" had given birth to a male calf we named "Joey". The calf looked to be in fine health and was observed to suckle. The following day the calf was separated from the dam, shorts were given, and he was weighed at 69.5 kg (153 lbs.). At three months of age he was also allowed access with the herd to the Veldt after several one to one introductions with each herd member. All was going well and "Gloria", after two unsuccessful births, was able to prove herself an excellent mother. Our zoo, along with SSP, decided to ship this male calf to Ruhr Park Zoo also. This time we waited until the calf was nine months of age to separate it from the mother, because we felt our earlier problems with "Angela" going off feed was due to her young age at separation. We also did the separation gradually, starting at a couple of minutes a day up to several hours, until after a week, final separation was achieved. The mother "Gloria" was to be shipped to White Oaks Plantation. This decision was made as we were uncertain of her sire and the possibility of inbreeding.

On 28 February 1989, "Edith" was observed to be producing milk. Her udder had undergone a definite change on the regular keepers' days off. We had breeding observations of her since her access to the herd and a possible birth date of May 1989. This new development was three months early and made the situation at our facilities quite hectic. We had "Joey" being conditioned for shipment; "Gloria" in a holding situation to be shipped, and "Edith" pregnant and close to birthing. Much to our relief "Joey" was crated on 20 March 1989 and shipped to West Germany. Nine days later "Edith" gave birth to a female calf we named "Rita". The birth took place at approximately 1000 hours and was observed by the staff. "Rita", at twenty-three minutes old, walked into the ditch and could not get herself out. The staff managed to pull her out with the mother staying reasonably calm. We then locked the dam and calf in the house while bales of straw were put in the ditch to prevent this incident from reoccurring. The following day the dam and calf were separated, shots were given, and "Rita's" weight was recorded at 75 kg (165 lbs.).

"Gloria" had still not been shipped to White Oaks Plantation and was being kept in the south yard with a shipping crate for conditioning. We were left with one alternative for the dam and calf: lock them in the house at night and give them access to the north yard during the day while the herd was on the Veldt. The calf seemed somewhat lethargic, but we assumed this was due to the restricted night quarters. On the morning of 6 April 1989, the keeper found "Rita" laying on her side in distress. Cagemate trauma was suspected. "Rita" was separated from her mother but died before treatment could be instituted. A necropsy was performed and a congenital defect was found. The defect was a diaphragmatic hernia; a loop of intestine had slipped through the defect and become strangulated.

The following day, "Edith" was allowed access to the herd. On 12 April 1989, "Gloria" was crated and delivered to White Oak Plantation. This reduced our rhino population to 2.3. Currently our zoo is considering sending our young male, "Giant", to New Zealand in October 1989.

Conclusion

We feel that our breeding successes can be attributed to two main factors: the decision to go from a pair to a group setting and to allow this group a more "natural" environment. Since

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the initiations of these decisions we have had 5.5 rhino births. 2.2 of these rhinos have survived. Of our deaths 0.1 was caused by congenital defect, 3.2 have been the result of some sort of improper management (2.1 from trauma inflicted by the adults, 1.0 from drowning in the drainage ditch, and 0.1 from Salmonella septicemia contracted from the mud wallows). As we have encountered these problems we have done our best to solve them and prevent reoccurrence. Our inability to determine exact dates of conception has been our main cause of infant mortality, as we have found that gestations can range from sixteen to eighteen months. It is crucial to have accurate breeding records and close observations by keepers of females suspected of being pregnant.

At this point in time our zoo is undergoing extensive redevelopment. In the next five years we plan to reorganize our zoo into continents, with Africa being centralized by our Veldt. Ideas have been brought forward to redo the whole housing structure of our rhinos. Several improvements have been suggested, that if achieved could enhance our management and breeding possibilities. Plans to enlarge our rhino facilities and create more holding and shifting capabilities, plus devices such as urine tapes and squeeze cages to determine estrous cycles, are some ideas we would like to see incorporated into this new structure. Acquiring additional unrelated females would be another of our top priorities.

With these ideas under consideration, the future of the Jacksonville Zoo's rhinos looks bright. Upon talking to our zoo's director, Mr. Dale Tuttle, our final conclusion has been arrived at; the Jacksonville Zoo has a unique setting in our African Veldt for breeding rhinos and it should be utilized to its fullest extent.

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Photo Credits

Thacker, William, Education Supervisor, 1987, pictures 1, 2 and 3.

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